AIM User's Manual

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Lawrence
Livermore
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Laboratory

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(version 2.2o)

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1.0 Introduction

Aim is a general purpose set of IDL routines using widgets for the analysis of experimentally measured images and spectra. With these routines the user can point and click to open image files, display the image, draw contour plots, draw surface plots, take lineouts, subtract background signals, and perform a generally complete set of image analysis procedures. A calibration can be performed for the horizontal and vertical axis (assuming a polynomial fit to the data). If the image file is from film then a wedge calibration can be performed to convert from film density to exposure. Both axis and wedge calibrations can be stored in an ASCII file (*.wdg) that will automatically be read in the next time the file is opened.

These routines have been used mainly at Lawrence Livermore National Laboratory but are applicable to the analysis of any two-dimensional data set. A color monitor at least 17" in size is recommended. I have employed IDL user library routines when possible. If the user is proficient in IDL it is fairly easy to modify or add features to the code. Most of the widgets have a help button that explains the various features in aim. It has been tried out on Mac, VMS, and UNIX systems with IDL version 3.6 or higher. Let me know of any bugs that you find. If you add a routine that may be of general interest, let me know and I will include it in the basic package.

1.1 Installation

To install simply copy all the files in the four directories *IDLlib_aim*, *IDLlib_jcm*, *IDLlib_users and Sample_files* to your hard disk. Then set your IDL search path set so it can find the aim routines. The *IDLlib_jcm* directory contains general plotting routines that can be used by other IDL programs, while the *IDLlib_users* directory contains routines written by other IDL users. It is recommended you first change the variable *jsav.maindir* located in the routine *aim_pref.pro* to a string containing the name of the directory in which the aim package is placed. The following are examples for the various operating systems.

```
jsav.maindir='/home/moreno/aimdir/'          (UNIX system)
jsav.maindir='home:moreno:aimdir:'           (Macintosh system)
jsav.maindir='[moreno.aimdir]'               (VMS system)
jsav.maindir='\home\moreno\aimdir\'          (Windows system)
```

To start the program type *aim* while in IDL. The main widget window should pop up and you are up and running. If you have any questions or problems you can contact me by phone or e-mail.

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2.0 Aim Tutorial
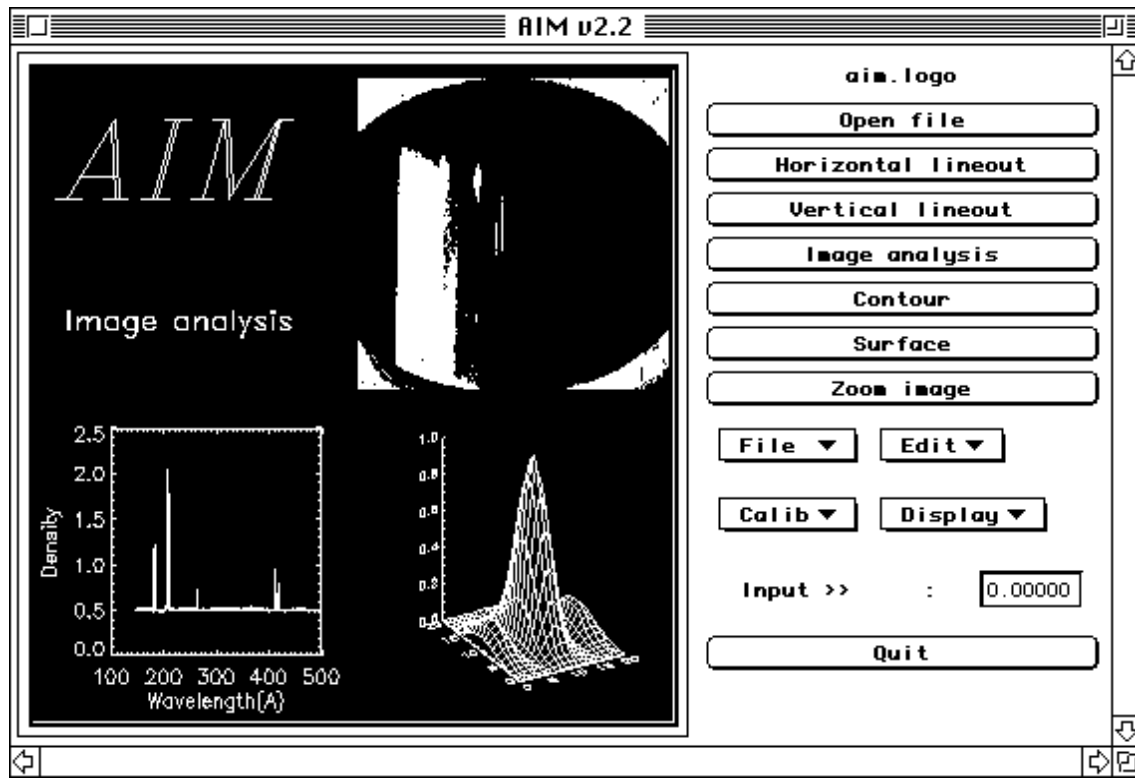
This tutorial will open a sample file and go through some of the more useful image analysis routines. Type *aim* while in IDL to start the program. You will see a widget window like the picture shown above.

2.1 Opening a file

Button - **Open file**

Click this button to open a new widget window called aim_open.

Button - **Open**

In the aim_open window click this button to run the *pickfile* routine that allows you to select a file. Go to the sample files directory and open the file *spectrum1.img*. Wait a few seconds for the file to be read in. After the file is read this window will be closed and the image will be displayed in the main window.

Note that the image is resized for display in this main window. However the main data array that is read in is not changed. The main data array can only be changed using one of the selections in the pull-down menu **Edit**. All other selections in this widget window only change the way the data is displayed.

2.2 Doing a wedge calibration

Pull down menu - **Calib**

Pull down this menu and select the menu item **Analyze wedge**. A new widget window called aim_wedge will be opened.

Button - **Select file**

In the aim_wedge window click this button to select the wedge file.

Pull down menu - **Menu**

Pull down this menu and select the menu item **Auto wedge fit**. The end points of the wedge will be determined automatically and a spline fit will be performed. If the user wants to change the end points he can change X_left and/or X_right and then again select **Auto wedge fit**. Alternatively the user can click on the **Do wedge fit** button and interactively select the end points by clicking on them in the graph region.

Pull down menu - **Menu**

Pull down this menu and select the menu item **Save wedge fit**. You should then save the wedge fit to a file named *spectrum1.wdg* or if your file is called *fname.img* you should save it as *fname.wdg*. There will probably already be a *spectrum1.wdg* file that you can replace. The next time the image file is opened it will automatically find the *spectrum1.wdg* file so you won't have to redo the wedge fit. This *spectrum1.wdg* file is an ASCII file that also contains the axis calibration.

Button - **Done**

Click this button to close the aim_wedge window.

2.3 Doing an axis calibration

Pull down menu - **Calib**

Pull down this menu and select the menu item **Change calibration**. A new widget window called aim_chcal will be opened. This widget displays the present calibration for the x and y-axis. The calibration assumes a polynomial fit to the position (mm) of the data points. The labels, units, and coefficients of the polynomial can be changed by entering new values.

Button - **Done**

Click this button to close the aim_chcal window.

2.4 Taking lineouts

Button - **Horizontal lineout**

Click this button to do a lineout by opening a new widget window called aim_lineout.

Pull down menu - **Plot**

Pull down this menu and select the menu item **Lineout average**. This will take a lineout over the region shown in the main widget window. Adjust the sliders to new values and observe how the boxed in region changes in the main window. You must select **Lineout average** again to do a lineout that averages over the selected region. You may also select **Update**.

Button - **<<**

Click this button to shift the region you want to examine for a lineout. Try the other buttons >, >>, etc. Again you must select **Lineout average** or another type of lineout or **Update** to draw a new curve.

Pull down menu - **Axis units**

    2nd Pull down menu - **X-axis**

    Pull down this menu and select the menu item **Calibration**. The plot will be re drawn with the x-axis in calibrated units.

Pull down menu - **Plot**

Pull down this menu and select the menu item **Zoom in with cursor**. The user should now click and drag the mouse over a region of plot to zoom in on. A new plot will automatically be drawn.

Pull down menu - **Edit**

Pull down this menu and select the menu item **Axis range**. A new widget window called jcm_range will be opened. This widget displays the current plot range for the lineout. The user can use the sliders or type in directly the desired range for the plot. IDL by default will round off the range to achieve uniform grid spacing. If the user wants the exact specified range then the exact range button should be selected.

Button - **Done**
    Click this button to close the jcm_range window.

Pull down menu - **Mem_funct**
    Pull down this menu and select the menu item **Goto memory.** A new widget window called jcm_memory will be opened. This widget can be used to store plots in memory that can then be compared to other plots or used for background subtraction, etc.

Pull down menu - **Menu**
    In the memory widget pull down this menu and select the menu item **Store lineout.** The plot presently displayed in the lineout window will be stored in this memory location.

Pull down menu - **File**
    Select the item **Done** to close the jcm_memory window.

Pull down menu - **File**
    In the aim_lineout widget pull down this menu and select the menu item **Save to postscript-ascii file** A new widget window called jcm_savgraph will be opened. The graph can now be saved to a postscript file that can be sent directly to a printer. The default is landscape postscript. Click on the save button and select the name of the postscript file. After saving a file this window will close automatically.

2.5 Looking at images

Button - **Image analysis**
    Click here to draw the image in a new widget window called aim_image. This widget window can be used to select a portion of the image to view, enhance the image, etc., and then save it to a postscript file.

Pull down menu - **Plot**
    Select the menu item **Zoom in with cursor** and use the mouse to zoom in on portion of image by clicking and dragging from one corner of region to the other corner. A new image is drawn automatically using the *rebin* or *congrid* routine (see IDL manual). Note that the sliders show the beginning and final rows and columns of the region of the image that you are viewing.

Sliders- Start Column, Final Column, Start Row, Final Row
    These sliders allow one to precisely select the region of the image to view.

Pull down menu - **Plot**
    After adjusting the sliders to display a new image you must pull down this menu and select either **New image (rebin)** or **New image (congrid)**. The *rebin* routine is fast but the region you get may vary slightly from your selection since the dimensions must be integer multiples of the original dimensions. The *congrid* routine will interpolate to give exact dimensions you specify, however it is somewhat slower.

Button - **Update**
    Click on this button to update the image after using the sliders or some other image manipulation. This resizes the image using the same routine (either *rebin* or *congrid*) that was used previously.

Button on/off - **Axis(pix)**
    Click on this button to add an axis using the row and column numbers. If **Cnt_lev** > 0 then contour levels will be overlaid on the image.

Button on/off - **Axis(cal)**
    If set then the x-axis and y-axis calibrations will be used for the contour axis.

Pull down menu - **Menu**
    Select the menu item **Show lineout** to display a horizontal lineout of the image at position where you click your mouse on image. You can switch between horizontal and vertical lineouts by going to the pull down menu in the image lineout window.

Button - **Quit**
    Click on this button in the main window to quit aim. All windows opened by aim will close.

2.6 Preferences

It is possible to customize the size of the windows and plot preferences by opening the ASCII file aim_pref.pro and changing the appropriate variables. Here we list some possible changes.

The dimensions (in pixels) of the drawing windows can be adjusted with the following variables. For small monitors you may want to reduce these dimensions.

Lineout window	Image window	Surface window	Contour window
jdim.xline=400	jdim.ximage=420	jdim.xsurf=320	jdim.xcont=320
jdim.yline=300	jdim.yimage=420	jdim.ysurf=320	jdim.ycont=320

You can adjust the size and position of the lineout graph by adjusting the following variable.
```
jgra.pos=[.15,.1,.95,.85]
```

You can adjust the number of colors, number of levels, which colors to use in your contour plot with the following variables.
```
jcon.ncol=7
jcon.nlev=7
jcon.ccol=[0,40,80,120,160,200,240,20,60,100,140,180,220,255]
```

You can select the colors to use when doing lineouts by adjusting the following variable.
```
jsty.coltab=[255, 20, 60, 100, 140, 180, 40, 80, 120, 160, 200, 10,
50, 90, 130, 170, 210, 30, 70, 110]
```

The following variable allows you to select the default color table that is used at startup.
```
jsav.d_color=39
```

2.7 Hints/Suggestions

If the program crashes or you leave the widgets, you can type
```
IDL>  retall
IDL>  xmanager
```
This will start the xmanager and get back into the widget routine where you were. If there is a bug in the routine, IDL will show you where the problem is.

On a Mac you can capture images or plots using the standard Apple command-C from the keyboard and then paste them to another program, e.g., MS Word, MacDraw, etc. If you want a high quality image or plot in your document then it is recommended that you save the image or plot as an encapsulated postscript file and then import it into the other program. On a Mac the imported eps image will display as an X on the screen but will print out properly to a postscript printer. A program such as PS2EPS (shareware) or Transverter Pro can be used to convert the eps file to a Mac format eps file that will display properly.

Printing from IDL is still not implemented well on the Mac. I suggest you save the file as a landscape or portrait postscript file and then use a program such as ShowPages or DropPS to send it to the printer. On a VMS or UNIX system you can modify the program to use the appropriate 'spawn' command to send a plot to the printer automatically.

3.0 Main widget
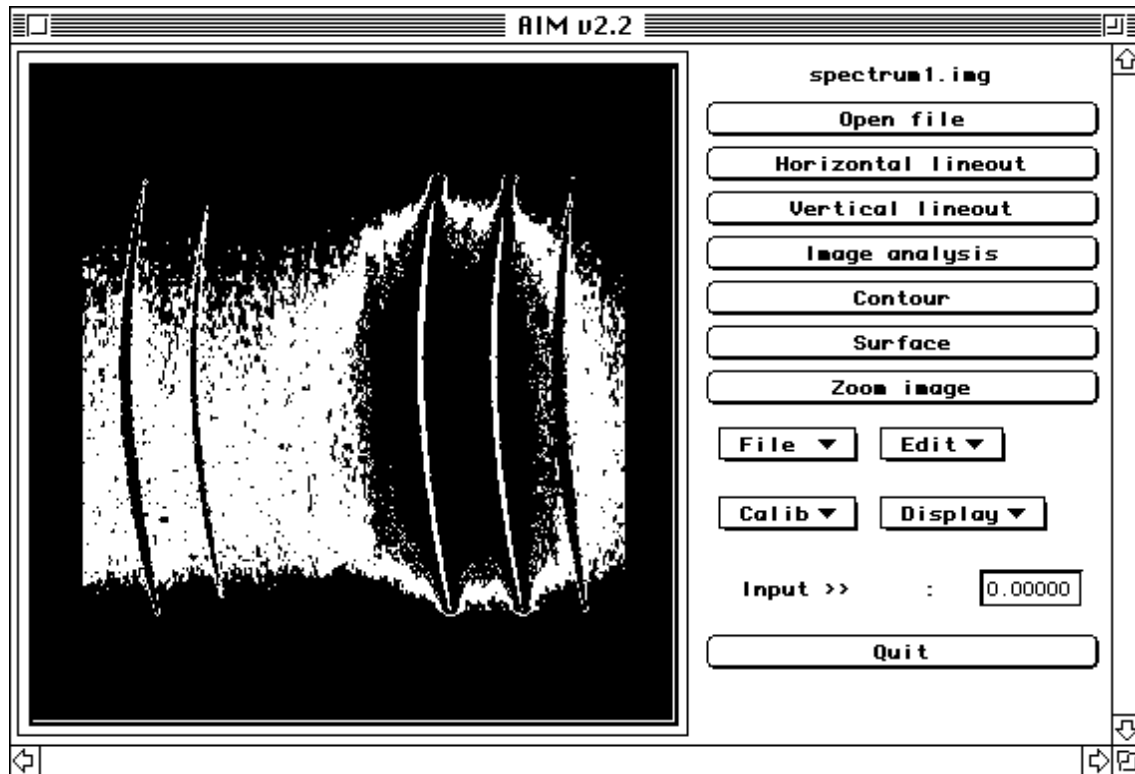
Button - **Open file**

Open and read a Y-div, V-div, TIFF, etc., file. Calls the routine *aim_open* that opens a new widget window. See section 4.0 for a complete description.

Button - **Horizontal lineout**

Draw horizontal lineout. Adjust scaling, calibration, axis, etc. Calls the routine *aim_lineout* that opens a new widget window. See section 5.0 for a complete description.

Button - **Vertical lineout**

Draw vertical lineout. Adjust scaling, calibration, axis, etc. Calls the routine *aim_lineout* that opens a new widget window. See section 5.0 for a complete description.

Button - **Image analysis**

Display and resize image. Adjust contrast, aspect ratio, add axis, etc. Calls the routine *aim_image* that opens a new widget window. See section 6.0 for a complete description.

Button - **Contour**

Draw contour plot. Calls the routine *aim_contour* that opens a new widget window. See section 7.0 for a complete description.

Button - **Surface**

Draw surface plots, shaded surface plots, etc. Calls the routine *aim_surf* that opens a new widget window. See section 8.0 for a complete description.

Button - **Zoom image**

Zoom in on image. Useful when taking lineouts and analyzing a small portion of the image. Calls the routine *aim_zoom* that opens a new widget window. See section 9.0 for a complete description.

Pull down menu - **File**

    File info

    Shows information about size of file, pixel size, etc. Calls the routine *aim_show* that opens a new widget window. See section 3.1 for a complete description.

    Save to file

    Saves image to a file, Y-div format, V-div format, etc. Calls the routine *aim_savfile* that opens a new widget window. See section 3.2 for a complete description.

    Save to memory

    Saves image array to memory, including all calibrations associated with it.

    Switch with memory

    Switch present image array with array in memory.

    Help

    Display help widget window showing information about the main widget.

    Stop

    Purposely causes an error in the program to get out of the xmanager and allow you to do any special image analysis or recompile a routine.

Pull down menu - **Edit**

    Use with care since all the selections in this pull-down menu will modify the main image array.

    Flip image up-down

    Flips image array up-down and redraws image in main widget window.

    Flip image right-left

    Flips image array right-left and redraws image in main widget window.

    Transpose rows-cols

    Switches rows and columns of image array and redraws image in main widget window.

    Convert to real

    Convert image data array to floating point real numbers. Will convert to exposure if wedge calibration has been performed.

    Average with image in memory

    Will average main image array with image array in memory and replace main array.

    Subtract image in memory

    Will subtract image array in memory from main image array and replace main array.

    Rotate

    Will rotate main image array by angle (degrees) entered into the **Input** >> box.

    Magnify X

    Will magnify horizontal dimension of image array by amount entered in the **Input** >> box.

    Magnify Y

    Will magnify vertical dimension of image array by amount entered in the **Input** >> box.

    Crop

    Will open a new widget window so user can crop the image and save the cropped image as the main image array. Use sliders to select crop region.

Pull down menu - **Calib**

    Analyze wedge

    Open and read wedge file to perform film density calibration. Calls the routine *aim_wedge* that opens a new widget window. See section 3.3 for a complete description.

    Change calibration

    Interactively change axis calibration. Calls the routine *aim_chcal* that opens a new widget window. See section 3.4 for a complete description.

Select calibration

    Select axis calibration from aim_cal.dat. Calls the routine *aim_calib* that opens a new widget window. See section 3.5 for a complete description.

Crystal spectrograph

    Do calibration for arbitrary crystal spectrograph. Calls the routine *aim_cryspec* that opens a new widget window. See section 3.6 for a complete description.

Grating spectrograph

    Do calibration for arbitrary grating spectrograph. Calls the routine *aim_gratspec* that opens a new widget window. See section 3.7 for a complete description.

SFFS

    Do calibration for SFFS spectrograph. Calls the routine *aim_sffs* that opens a new widget window. See section 3.8 for a complete description.

McPigs

    Do calibration for McPigs spectrograph. Calls the routine *aim_mcpigs* that opens a new widget window. See section 3.9 for a complete description.

Pull down menu - **Display**

All these selections change the way the image is displayed <u>without changing</u> the main image array.

Redraw, fill window

    Redraw image to fill main window using the *congrid* routine.

Redraw, aspect ratio=1

    Redraw image in main window using the *congrid* routine. Maintain aspect ratio of original image data.

Redraw, rebin

    Redraw image in main window using the *rebin* routine.

Redraw, rebin-sample

    Redraw image in main window using the *rebin* routine (with sample keyword). See IDL manual.

Edit

    Edit various display parameters. Calls the routine *aim_display* that opens a new widget window. See section 3.10 for a complete description.

Display memory

    Display image array presently stored in memory.

Default color table

    Go back to original color table used for this image.

Color tables

    Change the color table. Calls the routine *xloadct*. See IDL manual.

Color palette

    Adjust individual colors. Calls the routine *xpalette*. See IDL manual.

Read custom color table

    Read a user supplied color table from an ascii file. Calls the IDL *pickfile* routine. The file must contain 3 columns of equal length corresponding to the red, green, and blue values. Each column should have a length approximately equal to the number of colors available.

Text/editable - **Input >>**

Input for the image rotation or magnification. Use carriage return to enter.

3.1 File info

This widget displays file information such as the number of rows and columns, the pixel spacing, actual size of image, minimum and maximum values in image, data type and whether or not the wedge and axis calibrations have been performed.

Text/editable - **Delta X (um)**
   Horizontal spacing between points (microns) for the image data array.

Text/editable - **Delta Y (um)**
   Vertical spacing between points (microns) for the image data array.

Button on/off - **Low Expos approx**
   If set then will extrapolate the exposure to densities less than actually calibrated using the wedge.

```
▤□══════════════ aim_show ══════════════▤▥
                  spectrum1.img                        ⇧
  ┌────────────────────────┬────────────────────────┐
  │  Columns  =    545     │  Rows    =    112       │
  │                        │                         │
  │  Delta X (um) = │25.0000│ Delta Y (um) = │200.000││
  │                        │                         │
  │  Total X =  13.6250 mm │  Total Y =  22.4000 mm  │
  └────────────────────────┴────────────────────────┘
  ┌─────────────────────────────────────────────────┐
  │  (Total Y/Total X) =   1.6440                     │
  ├─────────────────────────────────────────────────┤
  │  Min =     331   Max =     2063                   │
  ├─────────────────────────────────────────────────┤
  │  File type: integer                               │
  ├─────────────────────────────────────────────────┤
  │  Wedge calibration done,     Axis calibration done│
  └─────────────────────────────────────────────────┘
  ⊠ Low Expos approx    │ Done │                      ⇩
  ◁                                                ▷▣
```

3.2 Save to file

Use this widget window to save all or a portion of the original image file to a new file.

Pull down menu - **File type**
   Select the file type to save the new file as. See section 4.0 for a more detailed description of files.

Y-div pds file :	integer data
V-div img file :	integer or real data
IPLab file :	integer data
PMIS file :	integer data
TIFF file :	byte data
PICT file :	byte data
GIF file :	byte data
HDF file :	byte data
ASCII data file :	integer data
IDL save file :	real data

Slider - **Start Col**
   Start column of image file to be saved.

Slider - **Final Col**
   Final column of image file to be saved.

Slider - **Start Row**
   Start row of image file to be saved.

Slider - **Final Row**
   Final row of image file to be saved.

Slider - **#Cols average**
   Number of columns to average over when saving image file.

Slider - **#Rows average**
   Number of rows to average over when saving image file.

Button on/off - **Transpose**
   If set then the rows and columns will be switched when saving the file.

Button on/off - **Box region**
   Click here to turn on/off the box in the main widget window showing region that is being saved.

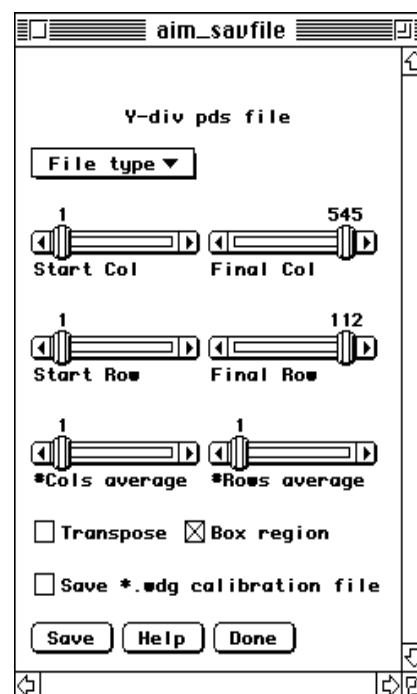**Button on/off** - **Save *.wdg calibration file**
   If set then a calibration file will also be saved along with the image file.

Button - **Save**
   Click here to save the file. Calls the IDL *pickfile* routine.

Button - **Help**
   Display help widget window showing information about this widget.

3.3 Analyze wedge

Use this widget window to perform a spline fit to wedge data and save the wedge calibration to a *.wdg file. The next time the image file is read, the *.wdg file will also be read automatically. Two types of spline fits are actually done. The *nr_spline* fit routine is generally used in aim since it is much faster.
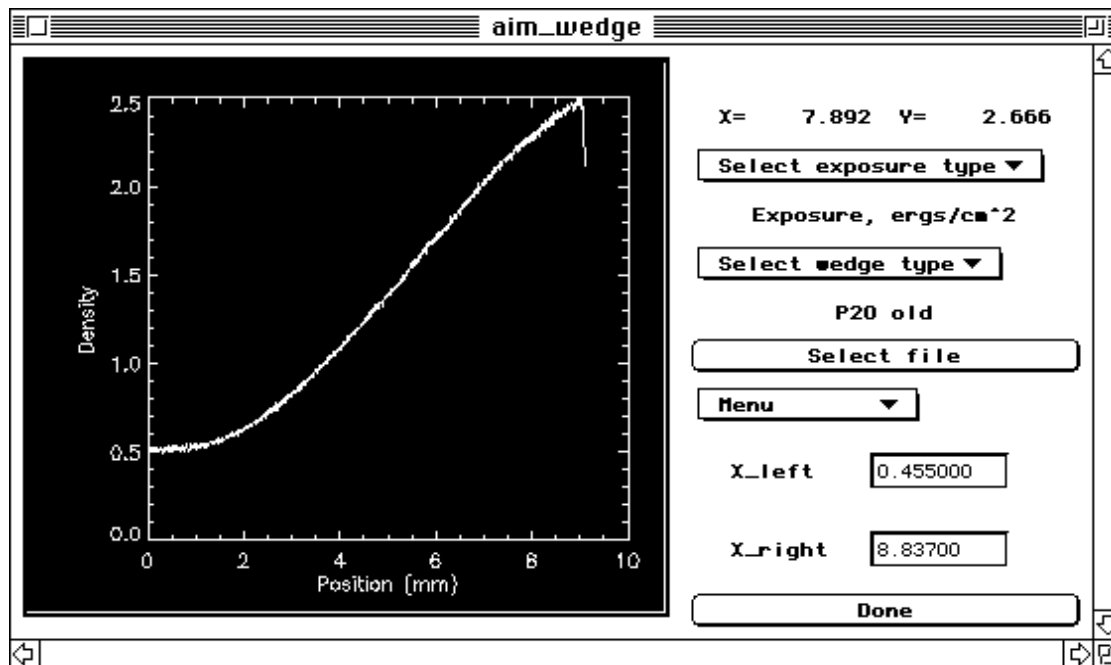
Pull down menu - **Select exposure type**

Exposure, ergs/cm^2
Absolute film calibration in ergs/cm^2. This is the default.

Exposure, relative
Relative scale based on minimum exposure.

Pull down menu - **Select wedge type**
Select one of the items listed below. The wedge type will depend on the instrument being used. These are wedges commonly used at LLNL. The user can add his own wedge.

P20 old
468 erg/cm^2 max exposure, factor of 0.4/cm

P11 cont
282 erg/cm^2 max exposure, factor of 0.4/cm

P11 updated
7.0 erg/cm^2 max exposure, factor of 0.4/cm

McPigs
2.1 erg/cm^2 max exposure, factor of 0.251/cm

X-ray
1.0 erg/cm^2 max exposure, factor of 0.3162/cm

P20 updated
468 erg/cm^2 max exposure, factor of 0.6/cm

101
Henke calibration for 101 film

Button - **Select file**

Select wedge image file containing raw wedge data. Will then automatically do spline fit to wedge. If the fit is no good then user should change the endpoints of the fit region (**X_left** and **X_right**), and then use **Auto wedge fit** to redo the wedge fit.

Pull down menu - **Menu**

Interactive wedge fit_

Will ask you to click mouse at beginning and end of region to do fit and then calculate spline fit to wedge. Positions will be entered into **X_left** and **X_right**.

Auto wedge fit

Will determine beginning and end region automatically or use **X_left** and **X_right** if they are already set. Will then calculate spline fit to wedge. **X_left** and **X_right** may be changed automatically to get a good fit. If fit is still not good change values for **X_left** and **X_right** and try again.

Read wedge fit

Will read *.wdg ASCII file containing spline fit to the wedge.

Save wedge fit

Save the wedge spline fit to an ASCII file (*.wdg) which also contains the axis calibration. Calls the IDL *pickfile* routine. It is recommended that you save the wedge spline fit for each file.

Plot wedge density vs position

Will plot wedge density vs position if a wedge data file has been read in.

Plot exposure vs position

Will plot exposure vs position if a wedge data file has been read in and the wedge calibration done.

Plot density vs spline fit to LogE

Will plot wedge density vs the spline fit the log of the exposure.

Plot density vs nr_spline fit to LogE

Will plot wedge density vs the nr_spline fit the log of the exposure.

Help

Display help widget window showing information about this wedge calibration widget.

Text/editable - **X_left**

Input for the beginning x position to do wedge calibration.

Text/editable - **X_right**

Input for the final x position to do wedge calibration.

3.4 Change calibration

This widget window is used to enter or change the axis calibration. The axis calibration uses a polynomial fit (up to degree 10). After settling on a good calibration it is recommended you save it to the *.wdg file so it will be automatically read in the next time you open the image file.

Text/editable - **X_label**
 Label for the x-axis calibration.

Text/editable - **Y_label**
 Label for the y-axis calibration.

Text/editable - **X_units**
 Units for the x-axis calibration.

Text/editable - **Y_units**
 Units for the y-axis calibration.

Text/editable-**X_start (mm)**
 Start position (mm) for the x-axis calibration.

Text/editable-**Y_start (mm)**
 Start position (mm) for the y-axis calibration.

Slider - **X Coeff. #**
 Select coefficient of polynomial to change for x-axis calibration. Can change this coefficient in the input field directly below the slider.

Slider - **Y Coeff. #**
 Select coefficient of polynomial to change for y-axis calibration. Can change this coefficient in the input field directly below the slider.

Pull down menu - **File**
 Update values
  Update the calibration if it has been changed somewhere else in aim.
 Save to WDG file
  Save this calibration to an ASCII file (*.wdg) which contains both the axis and wedge calibration. Calls the IDL *pickfile* routine.
 Save to aim_cal
  Save this calibration to the file aim_cal.dat which contains axis calibrations for more than one file.
 Save to CKT file
  Save this calibration to a cricket (ASCII) file. Calls the IDL *pickfile* routine.
 Read WDG file
 Read only the axis calibration from the ASCII file (*.wdg) which contains both the axis and wedge calibration.
 Help
  Display help widget window showing information about this change calibration widget.

3.5 Select calibration

This widget window shows the present calibration. The list on the left is from the file aim_cal.dat. You can click on one the names listed to use that calibration.
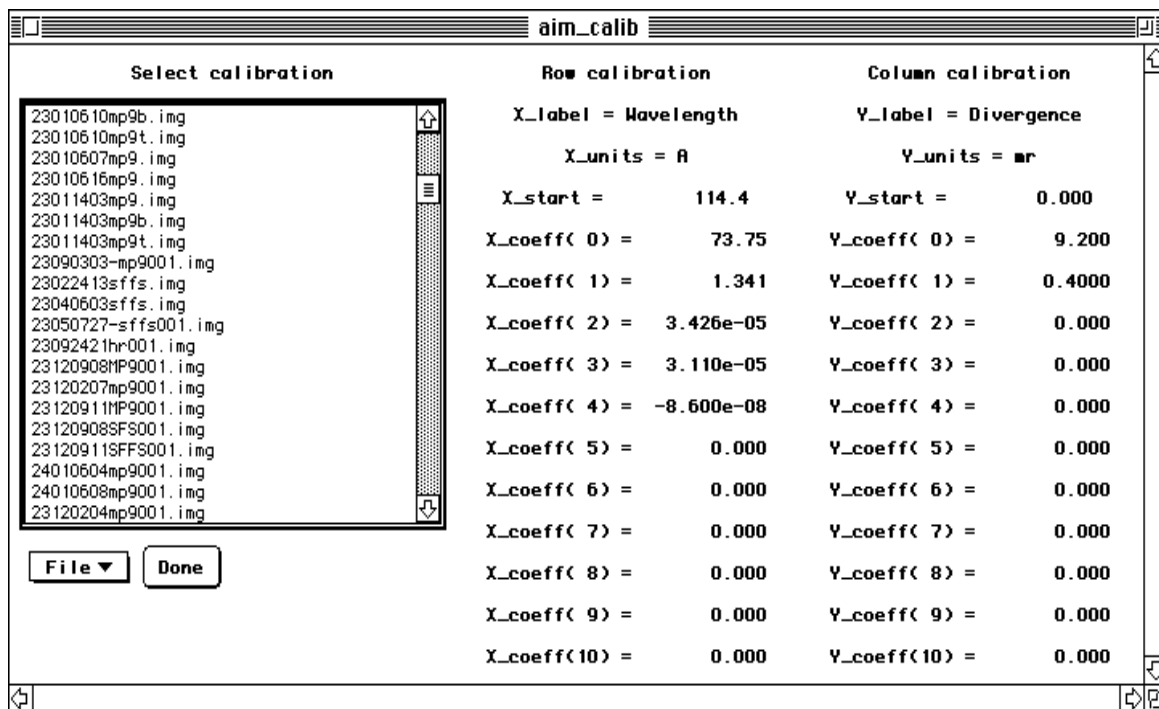
List - **Select calibration**

Click on one the names listed to select that calibration. The labels, units, start values and coefficients will be updated automatically.

Pull down menu - **File**

Read CKT file

Read calibration from a cricket file. Calls the IDL *pickfile* routine.

Save to aim_cal

Save this calibration to the file aim_cal.dat which contains axis calibrations for more than one file.

Save to WDG file

Save this calibration to an ASCII file (*.wdg) which contains both the axis and wedge calibration. Calls the IDL *pickfile* routine.

Reset

Reset calibration to default.

3.6 Crystal spectrograph

This widget window is used to determine a dispersion and polynomial calibration for an x-ray crystal spectrograph as well as plot the geometry.
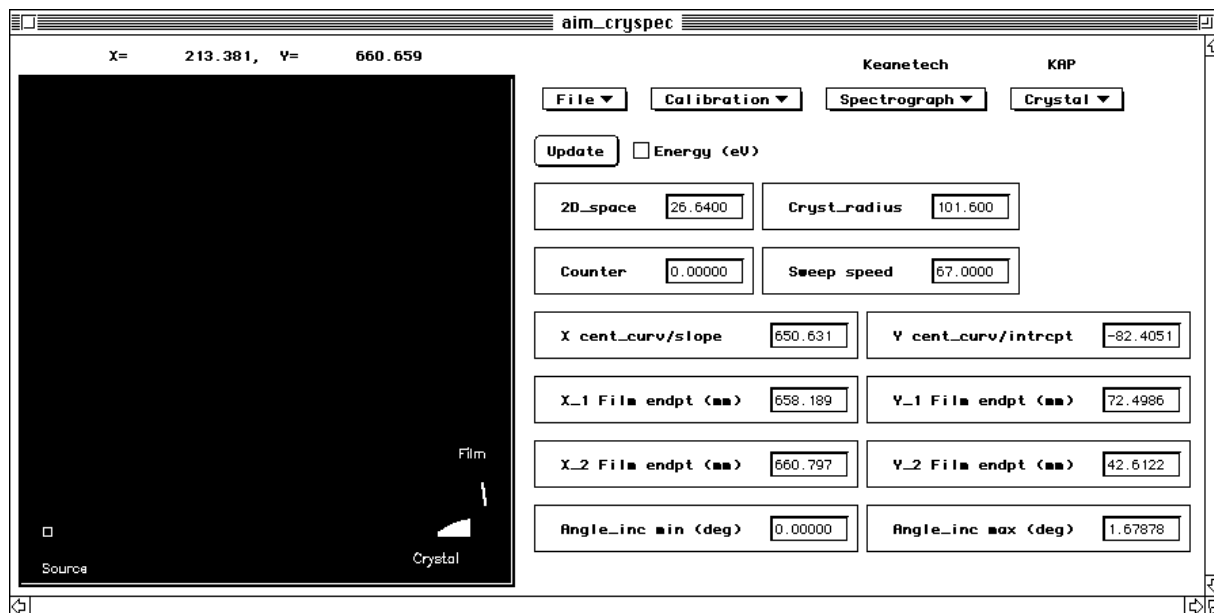
Pull down menu - **File**

Plot geometry

Show the source, crystal and film position in the draw window. The geometry will depend on all the Text/editable values entered below.

Save geometry postscript file

Save the plot of the crystal, source, film geometry to a postscript file that can be sent to a printer.

Show rays on-**off**

In the geometry plot show rays for the minimum and maximum angles.

Stop

Purposely causes an error in the program to get out of the xmanager and allow you to do any special image analysis or recompile a routine.

Pull down menu - **Calibration**

Plot calibration

Calculate and display the wavelength/energy calibration for this geometry using a polynomial fit.

Plot dispersion

Plot the wavelength/energy dispersion of the present calibration.

Apply calibration

Use this polynomial calibration as the axis calibration for all plots. Use the **change calibration** widget (section 3.4) to examine or change the calibration.

Save to WDG file

Save this calibration to an ASCII file (*.wdg) which contains both the axis and wedge calibration. Calls the IDL *pickfile* routine.

Save to aim_cal

Save this calibration to the file aim_cal.dat which contains axis calibrations for more than one file.

Print coefficients
  Print the coefficients of the polynomial fit in the IDL window.

Pull down menu - **Spectrograph**
  Convex
    Arbitrary convex x-ray crystal spectrograph.
  Flat
    Arbitrary flat x-ray crystal spectrograph.
  Concave
    Arbitrary concave x-ray crystal spectrograph. Not implemented.
  Keanetech
    X-ray crystal spectrograph with streak camera used on Nova 2-beam.

Pull down menu - **Crystal**
  Select type of crystal.
  KAP, PET, Graphite, **RAP, Quartz, Mica, LiF**

Button - **Update**
  If selected will update the calibration and geometry for the selected spectrograph parameters.

Button on/off - **Energy (eV)**
  If set will plot dispersion as a function of energy (eV) and calculate polynomial fit also as a function of energy (default = wavelength (A)).

Text/editable - **2D_space**
  The 2D spacing of the crystal.

Text/editable - **Cryst_radius**
  The radius of the crystal, (>0: convex, 0: flat, <0: concave).

Text/editable - **Counter**
  Wavelength counter setting for Keanetech or other spectrograph.

Text/editable - **Sweep speed**
  Sweep speed for a streak camera in ps/mm.

Text/editable - **X cent_curv/slope**
  X position (mm) of center of curvature of crystal.

Text/editable - **Y cent_curv/intrcpt**
  Y position (mm) of center of curvature of crystal.

Text/editable - **X_1 film endpoint**
  X position (mm) of one end of detector.

Text/editable - **Y_1 film endpoint**
  Y position (mm) of one end of detector.

Text/editable - **X_2 film endpoint**
  X position (mm) of other end of detector.

Text/editable - **Y_2 film endpoint**
  Y position (mm) of other end of detector.

Text/editable - **Angle_inc min (deg)**
  Minimum angle with respect to source at which x-rays reflect off crystal.

Text/editable - **Angle_inc max (deg)**
  Maximum angle with respect to source at which x-rays reflect off crystal.

3.7 Grating spectrograph

This widget window is used to determine a dispersion and polynomial calibration for a grating spectrograph as well as plot the geometry.
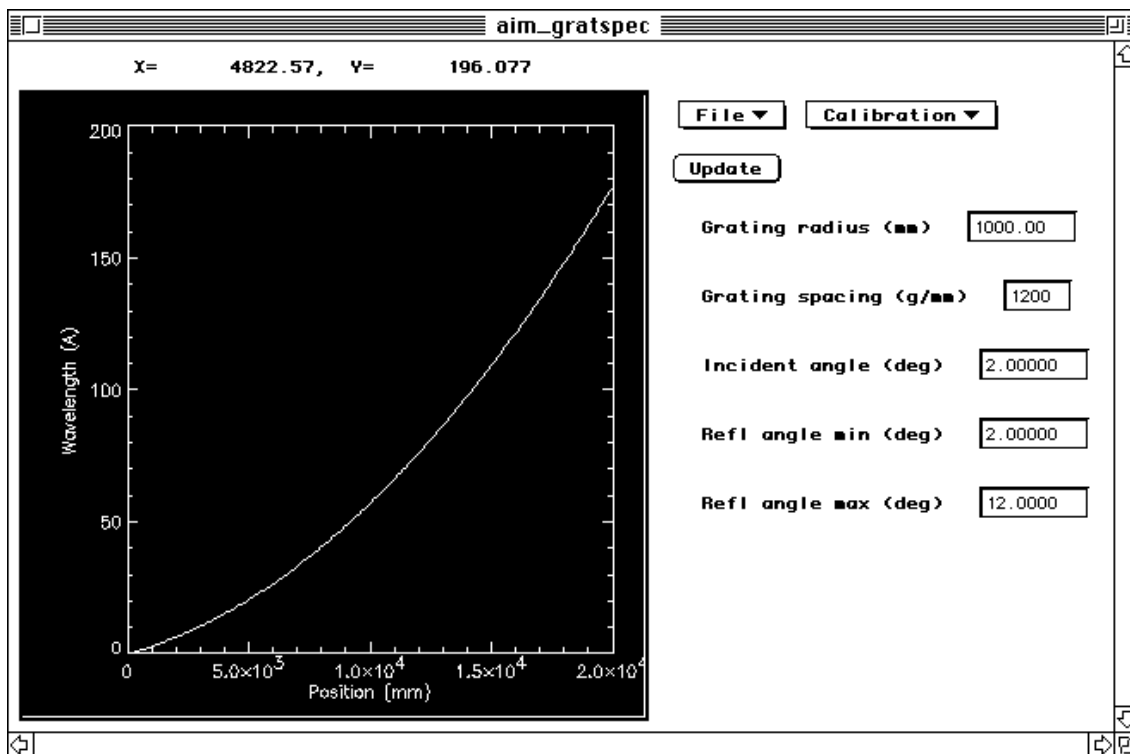
Pull down menu - **File**

   Plot geometry

   Show the source, grating and film position in the draw window. The geometry will depend on all the Text/editable values entered below.

   Save geometry postscript file

   Save the plot of the grating source, film geometry to a postscript file that can be sent to a printer.

   Show rays on-**off**

   In the geometry plot show rays for the minimum and maximum angles.

   Stop

   Purposely causes an error in the program to get out of the xmanager and allow you to do any special image analysis or recompile a routine.

Pull down menu - **Calibration**

   Plot calibration

   Calculate and display the wavelength calibration for this geometry using a polynomial fit.

   Plot dispersion

   Plot the wavelength dispersion of the present calibration.

   Apply calibration

   Use this polynomial calibration as the axis calibration for all plots. Use the **change calibration** widget (section 3.4) to examine or change the calibration.

Save to WDG file
    Save this calibration to an ASCII file (*.wdg) which contains both the axis and wedge calibration. Calls the IDL *pickfile* routine.

Save to aim_cal
    Save this calibration to the file aim_cal.dat which contains axis calibrations for more than one file.

Print coefficients
    Print the coefficients of the polynomial fit in the IDL window.

Button - **Update**
    If selected will update the calibration and geometry for the selected spectrograph parameters.

Text/editable - **Grating radius (mm)**
    Grating radius of curvature.

Text/editable - **Grating spacing (g/mm)**
    Grating groove spacing (grooves per millimeter).

Text/editable - **Incident angle (deg)**
    Incident angle onto the grating.

Text/editable - **Refl angle min (deg)**
    Minimum reflected angle from the grating.

Text/editable - **Refl angle max (deg)**
    Maximum reflected angle from the grating.

3.8 SFFS

Use this widget window to adjust calibration for spectra obtained using SFFS spectrograph at LLNL. Assumes spectral dispersion is horizontal in image.

Text/editable - Incident angle
Input angle of the Hitachi 1200 g/mm varied space grating.

Text/editable - Mirror position
The position of mirror in the SFFS.

Pull down menu - Sweep speed
Camera sweep speed that will be displayed in **Speed ps/mm** box.

Text/editable - Speed ps/mm
The speed in ps/mm of the streak camera.

Pull down menu - File

> **Apply calibration**
> Will apply this calibration for analysis of data. Use the **change calibration** widget (section 3.4) to examine or change the calibration.

> **Save to WDG file**
> Save this calibration to an ASCII file (*.wdg) which contains both the axis and wedge calibration. Calls the IDL *pickfile* routine.

> **Save to aim_cal**
> Save this calibration to the file aim_cal.dat which contains axis calibrations for more than one file.

> **Print coefficients**
> Print the coefficients in the IDL window for the calculated polynomial fit.

3.9 McPigs

Use this widget window to adjust calibration for spectra obtained using a McPigs spectrograph (a 1-meter grazing incidence spectrograph). Assumes spectral dispersion is horizontal in image.

Pull down menu - Grating
Select type of grating, 1200 g/mm, etc.

Slider - Angle (mr)
The central angle that the spectrograph is viewing. Useful for x-ray laser measurements.

Pull down menu - File

> **Apply calibration**
> Will apply this calibration for analysis of data. Use the **change calibration** widget (section 3.4) to examine or change the calibration.
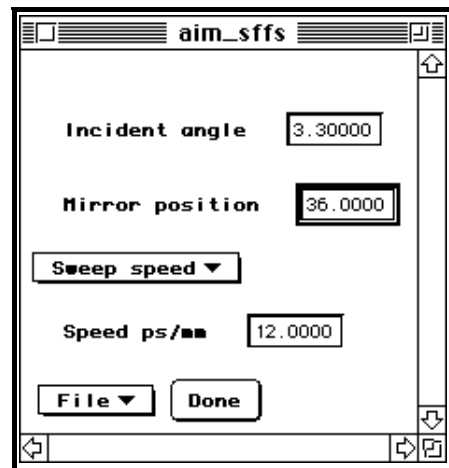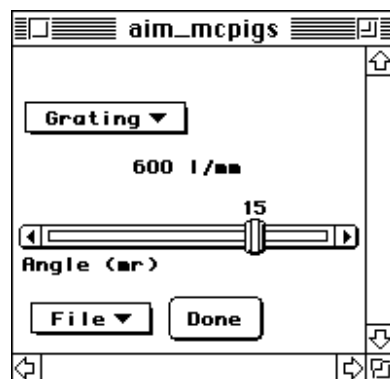
> **Save to WDG file**
> Save this calibration to an ASCII file (*.wdg) which contains both the axis and wedge calibration. Calls the IDL *pickfile* routine.

> **Save to aim_cal**
> Save this calibration to the file aim_cal.dat which contains axis calibrations for more than one file.

> **Print coefficients**
> Print the coefficients in the IDL window for the calculated polynomial fit.

3.10 Display

Use this widget window to adjust display parameters for the main aim draw window. Changing **top color** and **ticks out** will apply to all aim draw windows.

Text/editable - **X dimension (pixels)**
The horizontal dimension of the main aim draw window.

Text/editable - **Y dimension (pixels)**
The vertical dimension of the main aim draw window.

Text/editable - **Int min**
The minimum intensity to be displayed in the main aim draw window.

Text/editable - **Int max**
The maximum intensity to be displayed in the main aim draw window.

Text/editable - **Bottom color**
The minimum color value (0-255) to be displayed in any image plot.

Text/editable - **Top color**
The maximum color value (0-255) to be displayed in any image plot.

Button on/off - **Log 10 display**
If set then the log of the image intensity will be displayed in the main aim draw window.

Button on/off - **Ticks out**
If set then the ticks will be drawn on the outside of the axis on lineout and contour plots.

4.0 Open file

Use this widget to open and read an image file. The default file type is unknown. If unknown is selected then the routine will check if the file name ends with *img* or *hdr* (V-division format assumed), *pds* (Y-division format assumed), *ipl* (IPLab format assumed), *pmi* (Photometrics format assumed), *pic* (Macintosh Pict format assumed), *tif* (TIFF format assumed), *gif* (GIF format assumed), *hdf* (HDF format assumed).

Pull down menu - **File type**
>   Select type of file to open.
>   **Unknown**
>   Will check last three letters of file and if they match one of the types discussed above then that file type will be assumed.
>   **Y-div pds**
>   Will assume file is Y-division format. This is a binary file with a variable length header. This rest of the file contains the 2-dimensional integer array.
>   **V-div img**
>   Will assume file is V-division format. This format consists of two files, a *.hdr file that contains the header information in ASCII format, and a *.img file which is a simple binary file containing only the 2-dimensional integer or real array.
>   **NRL img**
>   Will assume file is NRL format. This format is the same as the V-div format except that header file is organized a little differently.
>   **IPLab**
>   Will assume file is IPLab format. This is a binary file in which the first 2120 bytes contain the header information. This rest of the file contains the 2-dimensional integer array.
>   **PMIS**
>   Will assume file is Photometrics format. This is a binary file in which the first 172 bytes contain the header information. This rest of the file contains the 2-dimensional integer array.
>   **SPE**
>   Will assume file is SPE format. This is a binary file in which the first 4100 bytes contain the header information. This rest of the file contains the 2-dimensional integer array.
>   **Raw integer*2**
>   Will assume file is a raw (binary) integer file. The number of columns and rows must first be entered in the boxes labeled **# Cols** and **# Rows**.
>   **TIFF**
>   Will assume file is TIFF byte format. Calls the routine *tiff_read*. See IDL manual for more details
>   **PICT**
>   Will assume file is Macintosh PICT format containing byte data. Calls the routine *read_pict*. See IDL manual for more details
>   **GIF**
>   Will assume file is GIF format containing byte data. Calls the routine *read_gif*. See IDL manual for more details
>   **HDF**
>   Will assume file is HDF format containing byte data. Calls the routines *hdf_open* and *hdf_dfr8_getimage*. See IDL manual for more details
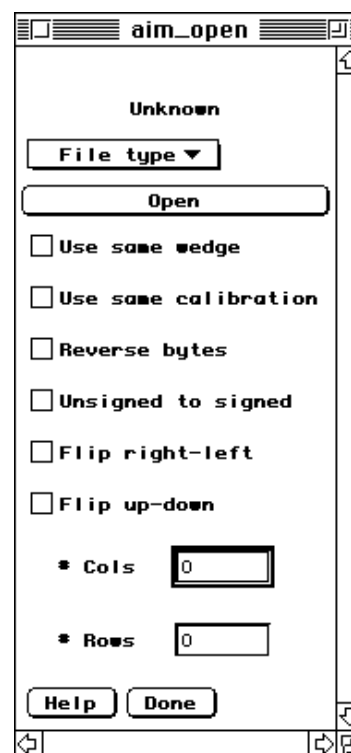
Raw byte

Will assume file is a raw (binary) byte file. The number of columns and rows must first be entered in the boxes labeled **# Cols** and **# Rows**.

ASCII 2-D

Will assume file is ASCII format with ten values per line. The first line in the file should contain the number of columns and the number of rows.

ASCII xy col

Will assume file is ASCII format with data in xy column format with each column of data separated by a character string.

ASCII counts

Will assume file is ASCII format with data in xy column format with each xy pair giving the xy position of a count on the detector. The number of columns and rows must first be entered in the boxes labeled **# Cols** and **# Rows**. The counts will be added up into bins determined by the number of rows and columns entered.

IDL save

Will assume file was saved using the IDL save command. The image array should be real and named img. The number of columns and rows must first be entered in the boxes labeled **# Cols** and **# Rows**.

Button - **Open**

Will call the routine *pickfile* so you can select the file to open and read into aim.

Button on/off - **Use same wedge**

If set will use same wedge as previous image when opening image file.

Button on/off - **Use same calibration**

If set will use same axis calibration as previous image when opening image file.

Button on/off - **Reverse bytes**

If set will reverse the byte order of the integer array in the image file.

Button on/off - **Unsigned to signed**

If set will switch from unsigned integers to signed integers after reading in image file.

Button on/off - **Flip right-left**

If set then the image will be flipped right-left after being read in.

Button on/off - **Flip up-down**

If set then the image will be flipped up-down after being read in.

Text/editable - **# Cols**

The number of columns to read in for a raw integer or byte file.

Text/editable - **# Rows**

The number of rows to read in for a raw integer or byte file.

Button - **Help**

Display help widget window showing information about this open file widget.

5.0 Lineouts

This widget window is used to display lineouts. By moving the mouse over the plot the user will see in the main window (or zoom window) the corresponding image location. The labels for the lineout are Horizontal (or Vertical), Poly followed by the first three coefficients of the polynomial fit if the x-axis is using a calibration, Smooth followed by the number of neighboring points the plot is smoothed over, the file name, the beginning and ending row (or column) numbers, and the beginning and ending calibration values.
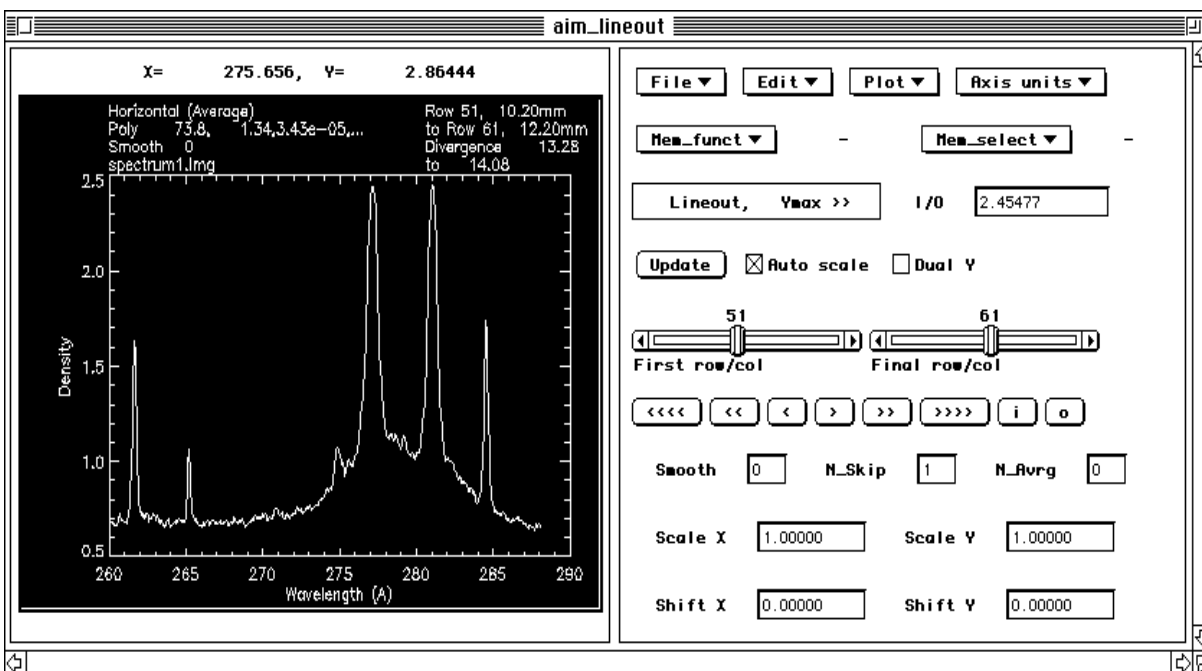
Pull down menu - **File**

Lineout info

Opens a new widget which shows information about the lineout such as the row or column range and the maximum and minimum location.

Save to postscript-ascii file

Save graph to postscript file or ASCII data file. Calls the routine *jcm_savgrph* that opens a new widget window. See section 5.1 for a complete description.

Save to memory

Save lineout to first available memory location. Equivalent to opening the memory widget (using the pull-down menu **Mem_funct**) and storing the lineout.

Print

Not implemented. User can modify code to print from a UNIX or VMS system.

Help

Display help widget window showing information about this lineout widget.

Stop

Purposely causes an error in the program to get out of the xmanager and allow you to do any special image analysis or recompile a routine.

Pull down menu - **Edit**

2nd Pull down menu - **Calib to pts**

This pull down menu is used to compute the x-axis calibration by interactively selecting points and inputting a calibrated value.

Start

Start interactive calibration. Start clicking on points on the curve where the calibration is known. The present calibration will be displayed in the input text widget above the plot. Enter a new calibration for this point and go onto to next point.

Do poly fit

Finish interactive calibration. A polynomial fit will be calculated for the points selected. The degree of the polynomial will be one less than the number of points and will be shown in the input text widget above the plot. The user can change the degree of the polynomial by entering it into the input text widget. This button will then do a new polynomial fit.

Apply poly fit

Use this polynomial fit as the horizontal calibration (for a horizontal lineout) or vertical calibration (for a vertical lineout). Use the **change calibration** widget (section 3.4) to examine or change the calibration.

Clear

Cancel interactive calibration.

Find start(mm)

Click on graph at a known position and enter the calibrated value. Use this to change the start position (mm) that is used for the calibration without changing the polynomial fit.

Change start(mm)

Assume present polynomial fit for calibration is correct and change start position(mm) to have calibration match with value entered with **Find start(mm)**.

2nd Pull down menu - **Fringes**

This pull down menu is used to locate and plot fringes for interferometer data.

Backgrnd fringes

Select region to determine background fringe spacing.

Calculate fringes

Determine fringes in this lineout.

Show fringe shift

Plot fringe shift vs. distance based on the background fringe spacing already determined.

Show density

Plot electron density vs. distance. The electron density is proportional to the fringe spacing and the plasma length.

Add fringe (max)

Click on spot to add fringe, will add fringe at nearest local maximum.

Add fringe (min)

Click on spot to add fringe, will add fringe at nearest local minimum.

Add fringe (pt)

Click on spot to add fringe, will add fringe at point of mouse click.

Delete fringe(s)

Click on fringes and they will be deleted, to stop click on region with no fringe.

Change peak_cutoff

Change cutoff for determining fringes. The cutoff is a measure of the minimum fringe intensity to the background intensity. Reduce this value if not all the fringes are being found. (default=1)

Change L

Change plasma length for determining electron density.

Find peaks

Simple routine to find peaks of spectral lines. Calls the routine *aim_pkfind* that opens a new widget window. See section 5.2 for a complete description.

Fit line

Fit Gaussian or Lorentzian to line. Calls the routine *aim_fitline* that opens a new widget window. See section 5.3 for a complete description.

Find average y

Show average of lineout.

Find FWHM

Show full width at half-maximum of lineout.

Axis range

Adjust the axis range, linear or log plot. Calls the routine *jcm_range* that opens a new widget window. See section 5.4 for a complete description.

Plot labels

Add or change user positioned labels in lineout. Calls the routine *jcm_label* that opens a new widget window. See section 5.5 for a complete description.

Line-point style

Select or change line and/or point style of plot. Calls the routine *jcm_pstyle* which opens a new widget window. See section 5.6 for a complete description.

Graph position

Change position of graph on screen/output. Calls the routine *jcm_gsize* which opens a new widget window. See section 5.7 for a complete description.

Grid-tickmarks

Change grid or tickmarks. Calls the routine *jcm_grid* that opens a new widget window. See section 5.8 for a complete description.

Pull down menu - Plot

Replot

Replot graph with any axis or label changes.

Zoom in with cursor

Click and drag mouse to zoom in on region.

Zoom out

Zoom out a factor of three.

Lineout, Average

Average lineout over all rows/columns in region determined by sliders.

Lineout, Multiple

Lineout of each row/column in region determined by sliders.

Lineout, Sequence

Sequentially display lineouts of all rows/columns in selected region.

Lineout, Integral

Integral of average lineout.

Lineout, Int-back

Integral of average lineout minus average of two outermost rows/columns. Used to subtract background from the integral.

Shift range right-up

Shift range to the right/up for this horizontal/vertical lineout.

Shift range left-down

Shift range to the left/down for this horizontal/vertical lineout.

Axis, no lineout

Plot axis only.

White background on-off

Switch between black or white background.

Switch Horiz-Vert

Switch between horizontal and vertical lineout.

Reset lineout

Reset lineout to full range, also reset scale and shifts.

Pull down menu - Axis units

2nd Pull down menu - X-axis

Row/Column #

Plot x-axis as row or column number.

Position (mm)

Plot x-axis as film position (mm).

Calibration

Plot x-axis using the polynomial fit.

Wavelength (A)

Use polynomial fit. Assumes calibration is for wavelength or energy.

Energy (eV)

Use polynomial fit. Assumes calibration is for wavelength or energy.

2nd Pull down menu - Y-axis

Density

Plot y-axis as film density.

Counts

Plot y-axis as integer value stored in file.

Exposure

Plot y-axis as film exposure. Must have wedge calibration for this image file.

Intensity

Plot y-axis as film exposure or CCD counts depending on file type. If a polynomial fit has been used for the x-axis then the area under the curve will remain the same as having the x-axis in mm.

Pull down menu - Mem_funct

Goto memory

Store or delete lineout or other data to memory. Calls the routine *jcm_memory* that opens a new widget window. See section 5.9 for a complete description.

Plot memory

Plots curve stored in currently selected memory location.

Add memory

Adds the curve stored in selected memory location to the present lineout.

Subtract memory

Subtracts the curve stored in selected memory location from the present lineout.

Multiply memory

Multiplies the curve stored in selected memory location to the present lineout.

Divide memory

Divides the curve stored in selected memory location by the present lineout.

Average with memory

Average the curve stored in selected memory location with the present lineout.

Pull down menu - Mem_select

No memory

No memory location selected.

Memory 1

Memory location 1 selected, etc.

Text/editable - **I/O**

Will display ymax by default after every plot. This widget is also used to enter numbers for axis calibrations or fringe searches.

Button - **Update**

Update the lineout. Include changes to row/column range selection, etc.

Button on/off - **Auto scale**

Automatically scale the y-axis for every plot.

Button on/off - **Dual Y**

Will display a dual y-axis graph. The second axis will correspond to the first stored curve in memory.

Slider - **First row/col**

First row/column to plot or average over for the horizontal/vertical lineout.

Slider - **Final row/col**

Final row/column to plot or average over for the horizontal/vertical lineout.

Button - **<<<<**

Shift range to left/down by 1/10 of total range.

Button - **<<**

Shift range to left/down by 10 rows/columns.

Button - **<**

Shift range to left/down by 1 row/column.

Button - **>**

Shift range to right/up by 1 row/column.

Button - **>>**

Shift range to right/up by 10 rows/columns.

Button - **>>>>**

Shift range to right/up by 1/10 of total range.

Button - **i**

Decrease y-axis range.

Button - **o**

Increase y-axis range.

Text/editable - **Smooth**

Smooth over this number of neighboring points to either side.

Text/editable - **N_skip**

Skip this number of rows/columns for multiple lineouts.

Text/editable - **N_avrg**

Average this number of rows/columns for lineouts.

Text/editable - **Scale X**

Scale x-axis by this number (default=1.0).

Text/editable - **Scale Y**

Scale y-axis by this number (default=1.0).

Text/editable - **Y shift**

Shift present y-axis by this number (default=0.0).

Text/editable - **X shift**

Shift present x-axis by this number (default=0.0).

5.1 Save graph to postscript-ascii file

Use this widget window to save your plot either as a postscript or ASCII file. To print the file directly use either landscape or portrait postscript. Use encapsulated postscript to include this plot in another document or application.

Pull down menu - **File type**
    Select the file type.

    Landscape postscript
        Save the plot to a landscape postscript file that can be sent directly to a printer.

    Portrait postscript
        Save the plot to a portrait postscript file that can be sent directly to a printer.

    Encapsulated postscript
        Save the plot to an encapsulated postscript file that can not be sent directly to a printer. This file can be imported into a MS Word, Persuasion, etc., document. On a Macintosh using MS Word or Persuasion the encapsulated postscript figure will not be displayed on the screen but will print out normally.

    ASCII
        Save the data points to an ASCII file containing x and y data in columns.

Button on/off - **Use color**
    If set will save to a color postscript file. You may get an error if you try to print a color postscript file to a B/W printer.

Button on/off - **Use 8 bits**
    If set will save postscript file using 8 bits (default = 4 bits).

Button on/off - **Boldface**
    If set will use boldface fonts in postscript file.

Button on/off - **Include labels**
    If set will include the displayed labels in the postscript file.

Button on/off - **Include logo**
    If set will display logo at the top. Default is LLNL logo.

Text/editable - **Figure caption with logo**
    If you selected *Include logo* then you any text entered here will be included as a caption next to the logo above the figure in the postscript file.
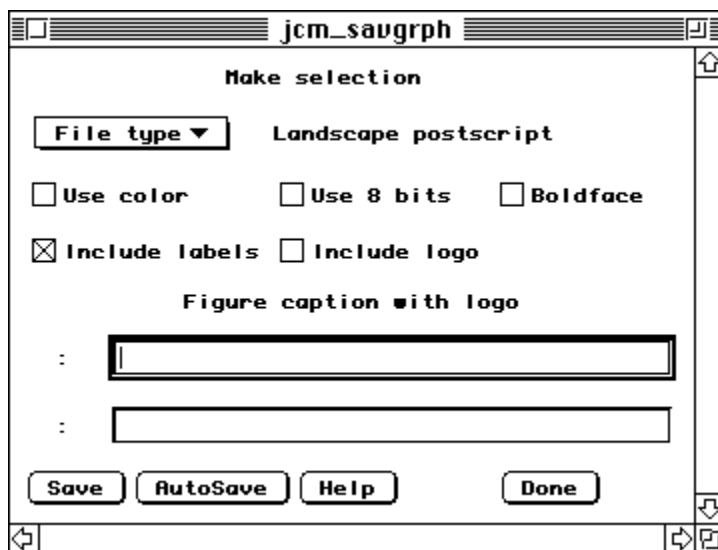
Button - **Save**
    Save the file using the IDL *pickfile* routine.

Button - **AutoSave**
    Automatically save to a postscript or ASCII file. The file name will be plot#.ps (or plot#.dat if ASCII file) where # will be an integer that is automatically incremented each time.

Button - **Help**
    Display help widget window showing information about this save graph widget.

5.2 Find peaks

This widget window is used to find peaks (lines) in a spectrum. A table will be shown in the window containing the peak #, row (or column), position on film or detector (mm), calibrated value if an axis calibration has been performed, calibrated value divided by two, and intensity of peak.
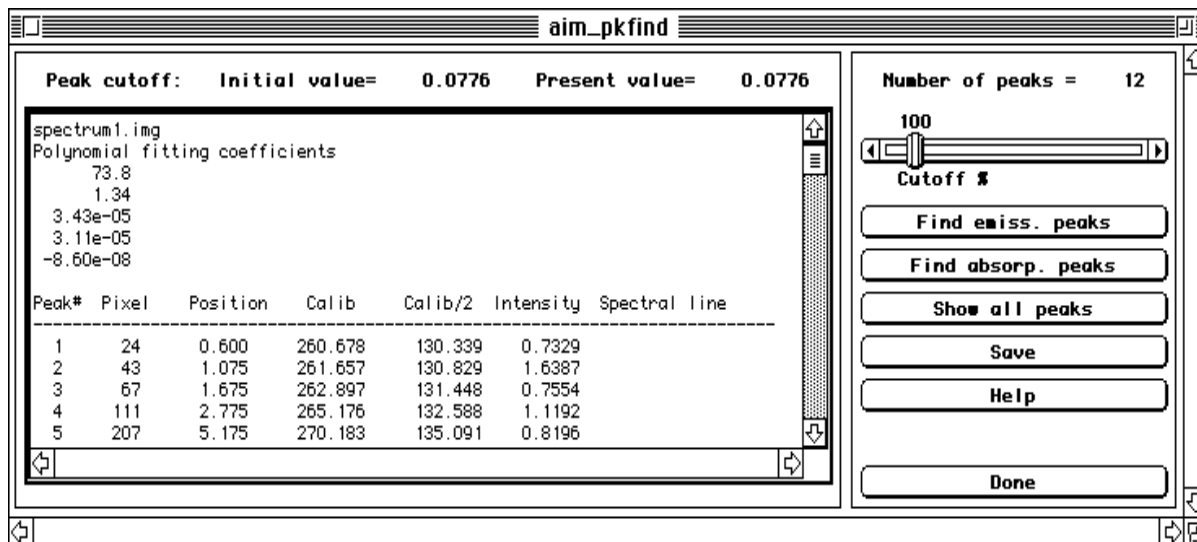
Slider - Cutoff %

Adjust level at which to find minimum peak (default = 100). A smaller cutoff will result in more peaks, while a larger cutoff will reduce the number of peaks.

Button - Find emiss. peaks

Find all emission (positive with respect to background) peaks.

Button - Find absorp. peaks

Find all absorption (negative with respect to background) peaks.

Button - Show all peaks

List all peaks that have been found in the window to the left.
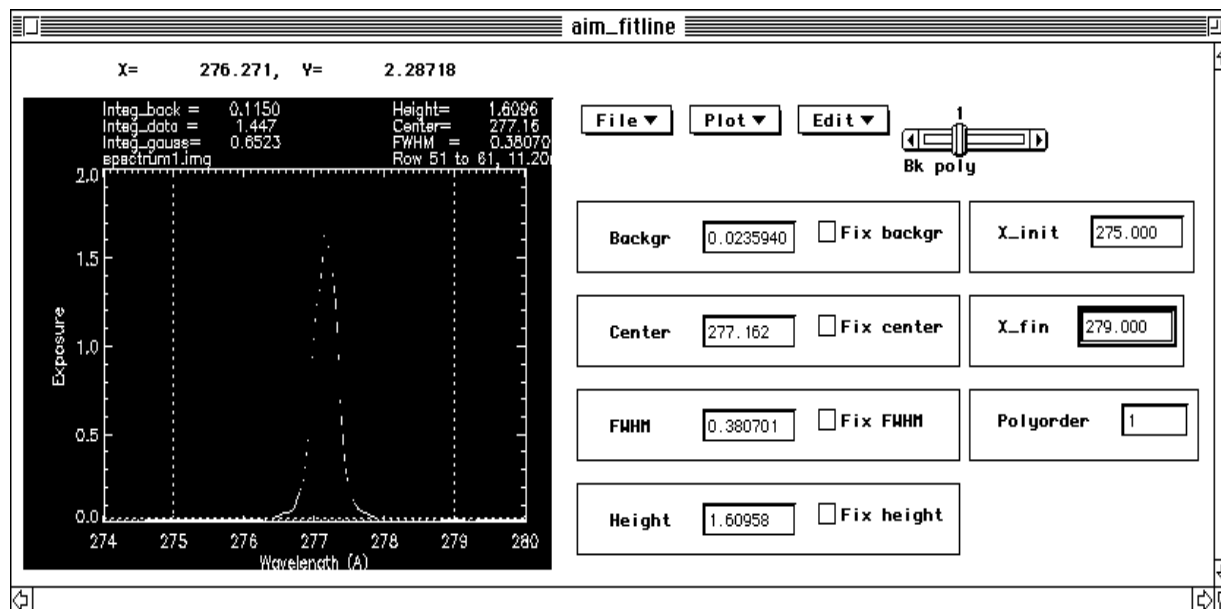
Button - Save

Save list of peaks to an ASCII file in the same format as is shown in the window. Calls the *pickfile* routine so you can choose the file name.

Button - Help

Display help widget window showing information about this widget.

5.3 Fit lines

Pull down menu - **File**

Save to postscript-ascii file

Save graph to postscript file or ASCII data file. Calls the routine *jcm_savgrph* that opens a new widget window. See section 5.1 for a complete description.

Save fit to memory

Save fitted curve to the first available memory location. Can check curves in memory by using the pull-down menu **Mem_funct** in the lineout widget.

Help

Display help widget window showing information about this widget.

Stop

Purposely causes an error in the program to get out of the xmanager and allow you to do any special image analysis or recompile a routine.

Pull down menu - **Plot**

Replot

Redraw the plot. Will include any changes in the x range or the line-point style.

Zoom in

Zoom in on line to fit using mouse to click and drag.

Zoom out

Zoom out to full range.

Update plot

Update the fitted curve using all values that have been entered.

Reset

Reset the x range to the initial values and plot initial curve.

Pull down menu - **Edit**

Polynomial fit

Fit lineout using <u>only</u> a polynomial. The order is determined by the slider **Polyorder**.

Gauss fit

Fit lineout using a Gaussian of the form $F(x) = A_0 \exp(-z^2/2)$, where $z = (x-A_1)/A_2$, and the coefficients are A_0, A_1, and A_2.

Lorentz fit

Fit lineout using a Lorentzian of the form $F(x) = A_0*A_2^2/(z^2+A_2^2)$, where $z = (x-A_1)$, and the coefficients are A_0, A_1, and A_2.

Print coefficients

Print to IDL window the coefficients for the fitted function.

Line-point style

Select or change line and/or point style of plot. Calls the routine *jcm_pstyle* which opens a new widget window. See section 5.6 for a complete description.

Slider - Bk poly

The degree (minus 1) of a polynomial to add to the Gaussian or Lorentzian for the fit. The fitted function is now of the form $F'(x) = F(x) + A_4 + A_5*X + A_6*X^2$, where $F(x)$ is either the Gaussian or Lorentzian described above and the coefficients A_4, A_5, and A_6 are optional depending on the value of this slider.

Text/editable - Backgr

The background level to assume when making fit and/or the value of A_4 after doing a fit.

Button on/off - Fix backgr

If set then the background level is fixed when determining fit.

Text/editable - Center

The peak position of the fitted line. The same as the coefficient A_1.

Button on/off - Fix center

If set then the peak position is fixed when determining fit.

Text/editable - FWHM

The full width at half-maximum of the fitted line. When fitting a Gaussian the coefficient A_2 = FWHM / (2*sqrt(2*ln(2))). When fitting a Lorentzian the coefficient A_2 = FWHM/2.

Button on/off - Fix FWHM

If set then the full width at half-maximum is fixed when determining fit.

Text/editable - Height

The height of the fitted line. The same as the coefficient A_0.

Button on/off - Fix height

If set then the height is fixed when determining fit.

Text/editable - X_init

The initial x value of axis range to use for determining fit. A vertical dotted line is drawn at this position.

Text/editable - X_fin

The final x value of axis range to use for determining fit. A vertical dotted line is drawn at this position.

Text/editable - Polyorder

The order of the polynomial for when <u>only</u> a polynomial fit to the curve is done.

5.4 Axis range

Text/editable - **X init**
  The initial x value to be plotted.

Slider - **X initial**
  Set initial x position (0-100) relative to full range. Will change the value in the **X init** box.

Text/editable - **X fin**
  The final x value to be plotted.

Slider - **X final**
  Set final x position (0-100) relative to full range. Will change the value in the **X fin** box.

Text/editable - **Y init**
  The initial y value to be plotted.

Slider - **Y initial**
  Set initial y position (0-100) relative to full range. Will change the value in the **Y init** box.

Text/editable - **Y fin**
  The final y value to be plotted.

Slider - **Y final**
  Set final y position (0-100) relative to full range. Will change the value in the **Y fin** box.

Pull down menu - **Select Linear or Log**
  Select type of plot, linear-linear, linear-log, log-linear, log-log.

Button on/off - **Exact range for x-axis**
  If set then x plot range will be exactly as selected rather than rounding off as is the default.

Button on/off - **Exact range for y-axis**
  If set then y plot range will be exactly as selected rather than rounding off as is the default.

Button - **Update range**
  If the x or y plot arrays have been changed then clicking this button will update the initial and final values and display them correctly in this window.

Button - **Set to limits**
  Will reset the x and y plot limits to the initial full plot range.

5.5 Plot labels

Text/editable - **User label**
Enter the label to be positioned by user.

Slider - **Label #**
Select the label number (1-20).

Slider - **Rotation**
Select rotation angle (degrees) for this label.

Button - **Reset**
Erase all labels and reset sizes and positions to their default values.

Slider - **X position**
Set the x position of the label relative to the plot window (0-100).

Slider - **Y position**
Set the y position of the label relative to the plot window (0-100).

Text/editable - **Label char size**
Set the user positioned label character size (default =1.0).

Text/editable - **Window #**
Window # where the label will be placed. Should not have to change this value. # 0 = Lineout window, # 1 = Image window, # 2 = Contour window

Text/editable - **X-axis label**
Enter the x-axis label.

Text/editable - **Y-axis label**
Enter the y-axis label.
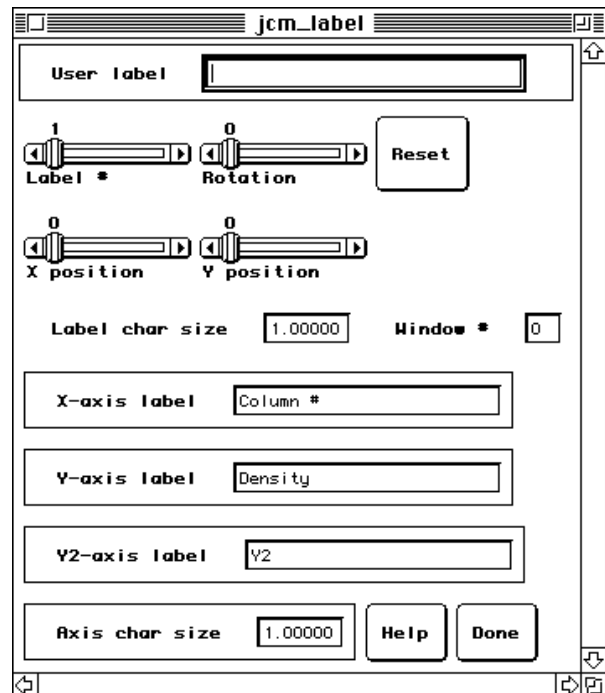
Text/editable - **Y2-axis label**
Enter the second y-axis label for a dual y-axis plot.

Text/editable - **Axis char size**
Set the axis label character size (default =1.0).

Button - **Help**
Display help widget window showing information about this widget.

5.6 Line-point style

Slider - **Trace #**
Select the trace number (1-20).

Slider - **point style**
Set the point style (0-19). Look in IDL manual for list of styles.

Slider - **line style**
Set the line style (0-19). Look in IDL manual for list of styles.

Slider - **color**
Set the color (0-19). The color will depend on the color table and the variable jsty.coltab.

Text/editable - **Line thickness**
Set the thickness of lines (default =1.0).

Button - **Reset**
Reset styles, colors, and thicknesses to their initial default values.

Button - **Help**
Display help widget window showing information about this widget.
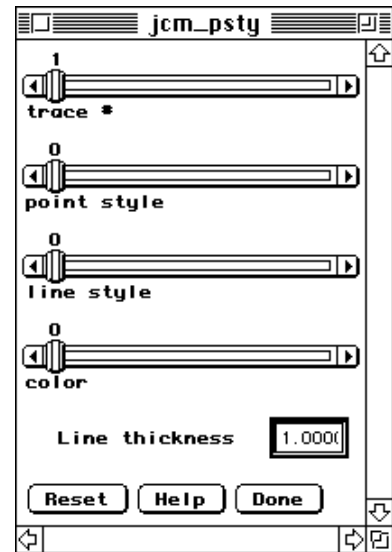
5.7 Graph position

Slider - **X left**
Set the left edge of x-axis relative to the plot window (0-100).

Slider - **X right**
Set the right edge of x-axis relative to the plot window (0-100).

Slider - **Y bottom**
Set the bottom edge of y-axis relative to the plot window (0-100).

Slider - **Y top**
Set the top edge of y-axis relative to the plot window (0-100).

Button - **Reset**
Reset axis position to initial default values.
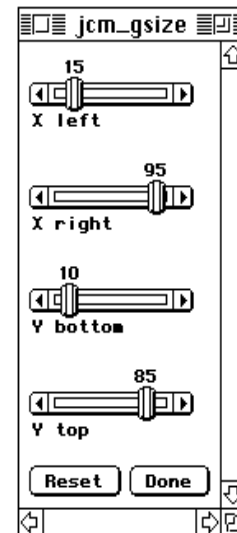
5.8 Grid-tickmarks

Button on/off - X-axis grid
If set will draw x-axis with a grid.

Button on/off - Y-axis grid
If set will draw y-axis with a grid.

Button on/off - X-axis box
If set will draw x-axis with a closed top.

Button on/off - Y-axis box
If set will draw y-axis with a closed right side.

Text/editable - X tklen
Set the x-axis tick length in normal units. If set to zero will use IDL default. If less than zero then the ticks will extend outside the window, rather than inwards.

Text/editable - Y tklen
Set the y-axis tick length in normal units. If set to zero will use IDL default. If less than zero then the ticks will extend outside the window, rather than inwards.

Text/editable - X thick
Set the x-axis line/tick thickness. Default = 1.0

Text/editable - Y thick
Set the y-axis line/tick thickness. Default = 1.0

Slider - X grid style
Set the x-axis grid style. See IDL manual under xgridstyle for more information.

Slider - Y grid style
Set the y-axis grid style. See IDL manual under ygridstyle for more information.

Slider - #major X ticks
Set the number of major ticks for x-axis. If set to zero will use IDL default.

Slider - #major Y ticks
Set the number of major ticks for y-axis. If set to zero will use IDL default.

Slider - #minor X ticks
Set the number of minor ticks for x-axis. If set to zero will use IDL default.

Slider - #minor Y ticks
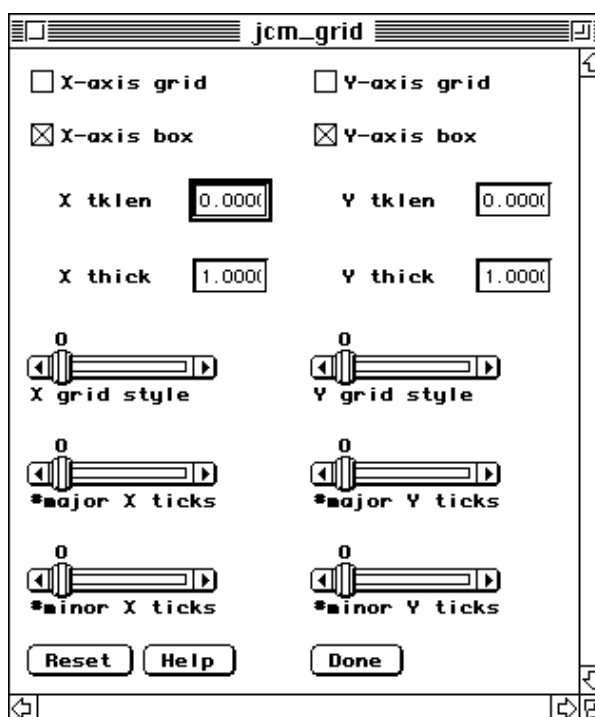Set the number of minor ticks for y-axis. If set to zero will use IDL default.

Button - Reset
Reset styles, tick length and number of ticks to their initial default values.

Button - Help
Display help widget window showing information about this widget.

5.9 Memory

This widget window allows the user to store lineouts in memory. Can also read in ASCII data files. This is useful for subtracting background, adjusting for filter response, etc.
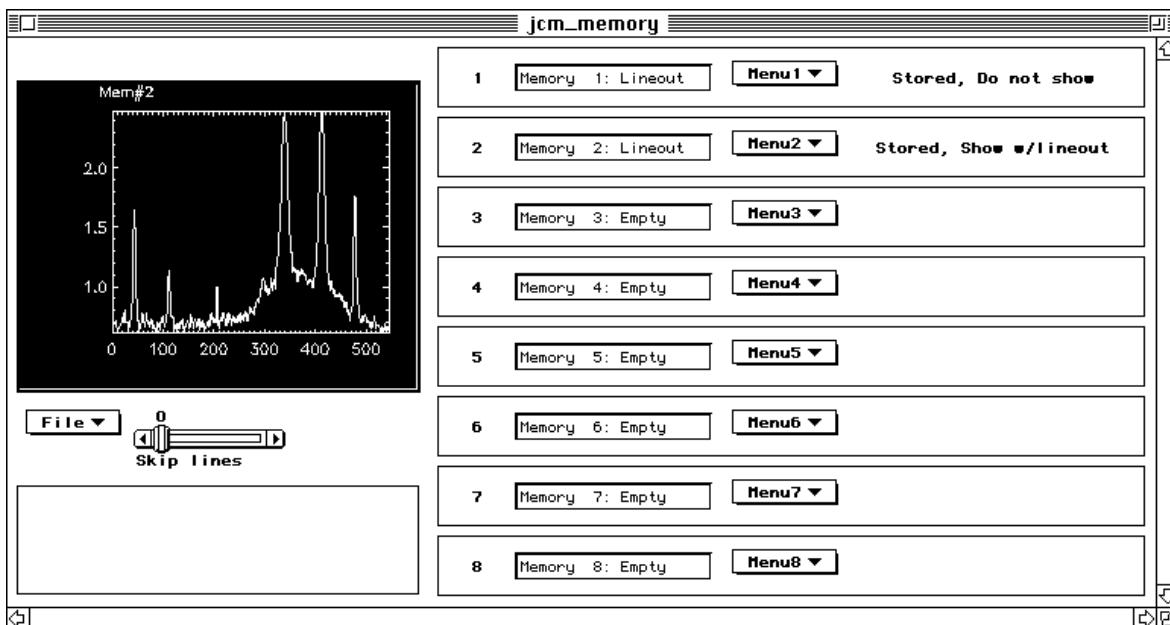
Pull down menu - **File**

Update	Update all the memory locations to include any changes.
Select ASCII file	Use pickfile routine to select the file. First four lines will be displayed.
Store ASCII file	Read in this file into next available memory location.
Help	Display help widget showing information about this widget.

Slider - **Skip lines**
Number of lines to skip when reading x-y data from ASCII file.

Text/editable - **1, [2, 3, 4, 5, 6, 7, 8]**
The label for plot in memory location 1, e.g. Memory 1: Lineout. Can be changed by user.

Pull down menu - **Menu1, [Menu2, Menu3, Menu4, Menu5, Menu6, Menu7, Menu8]**

Store lineout
Store whatever plot is in the lineout draw window in this memory location.
Store image plot
Store the lineout from the image analysis in this memory location.
Delete
Delete the plot in this memory location.
Show here
Display the plot presently stored in this memory location.
Show with lineout
The plot in this memory location will be displayed in the lineout window.
Show with image
The plot in this memory location will be displayed in the image analysis window.

6.0 Image analysis
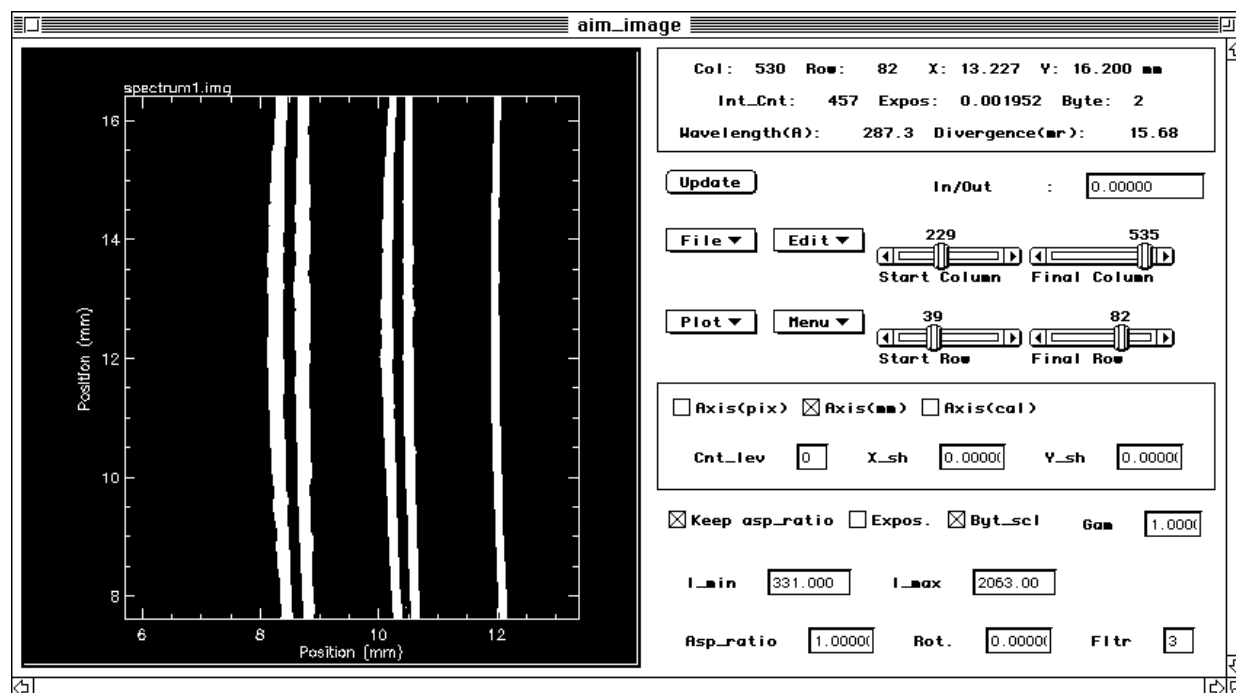
Button - **Update**
Update the image, including any row & column changes, changes to I_min or I_max, etc.

Text/editable - **In/Out**
Used for input and output, e.g., calibration, finding fringes, etc.

Pull down menu - **File**
Image info
Display information about image size, etc. Opens a new widget window.
Save to postscript-image file
Save image to a file. Either a postscript, TIFF, PICT, GIF, HDF, etc. file. Calls the routine *jcm_savimg* that opens a new widget window. See section 6.1 for a complete description.
Help
Display help widget showing information about the image analysis widget.
Stop
Purposely causes an error in the program to get out of the xmanager and allow you to do any special image analysis or recompile a routine.

Pull down menu - **Edit**
Labels
Add or change user positioned labels in image. Calls the routine *jcm_label* that opens a new widget window. See section 5.5 for a complete description.
Grid-tickmarks
Change grid or tickmarks. Calls the routine *jcm_grid* that opens a new widget window. See section 5.7 for a complete description.
Shapes
Add lines, rectangles or ellipses to image. Calls the routine *aim_shape* that opens a new widget window. See section 6.2 for a complete description.

2nd Pull down menu - **Calib to pts**

Do axis calibration by interactively selecting points and inputting calibrated value.

Start X

Start a calibration of the x-axis. Click on points where the calibration is known and then enter the calibrated value into the **In/Out** box

Start Y

Start a calibration of the y-axis.

Do poly fit

Finished with calibration. Perform a polynomial fit to the calibrated values. The user can also change the degree of the polynomial in the **In/Out** box and then select this button again to get a new calibration.

Apply poly fit

Use the polynomial fit as the calibration for x and/or y-axis. Use the **change calibration** widget (section 3.4) to examine or change the calibration.

Clear

Clear all calibration input.

Find fringes

Find vertical or horizontal fringes (or spectral lines). Can warp image to straighten spectral lines. Opens a new widget window. See section 6.3 for a complete description.

Average images together

Average several images together. Opens a new widget window. See section 6.4 for a complete description.

2nd Pull down menu - **Smooth-Filter**

Boxcar average

Use boxcar average to smooth image. See IDL manual for more information.

Lee filter

Use Lee filter on image. See IDL manual for more information.

Median filter

Use median filter on image. See IDL manual for more information.

2nd Pull down menu - **Erase region**

Erase a region on the image. Select region by clicking and dragging mouse.

Select, average

Click and drag mouse over portion of image to erase. Will use average of surrounding region with some randomness included depending on value of roughness parameter.

Select, median

Click and drag mouse over portion of image to erase. Will use median of surrounding region with some randomness included depending on value of roughness parameter.

Change roughness

Enter new value for roughness parameter in the **In/Out** box. Smaller value gives smoother image.

Apply to main image array

Use this erased region with the main image array.

2nd Pull down menu - **Save points to memory**

Save position of mouse clicks to memory and/or file.

Start

Click mouse on image and the xy position will be saved to memory.

Finish

Finished entering xy positions into memory.

Write to ASCII

Write xy positions in memory to an ASCII data file.

Clear
  Clear memory of xy data points.
2nd Pull down menu - Integral of region
  Integral
    Compute integral of displayed region.
  Integral - back
    Compute integral of displayed region minus the saved background.
  Save integral as back
    Save integral of displayed region as background level.
  Sum - back
    Compute sum of displayed region minus background, where the background is assumed to be the edge of the displayed region.
Save image to memory
  Save displayed image to memory.
Show image in memory
  Show image previously saved in memory.
2nd Pull down menu - 1D Memory_main
  Goto memory
    Open memory widget to save or look at plots. Calls the routine *jcm_memory* that opens a new widget window. See section 5.9 for a complete description.
  Divide horizontal by memory
    Divide rows of image by selected curve in selected memory location.
  Divide vertical by memory
    Divide columns of image by selected curve in selected memory location.
  Subtract memory from image horizontally
    Subtract curve in selected memory location from rows in image.
  Subtract memory from image vertically
    Subtract curve in selected memory location from columns in image.
2nd Pull down menu - 1D_Memory_select
  Select memory location.
  No memory
    No memory location selected.
  Memory 1
    Memory location 1 selected for dividing or subtracting.
  Etc.

Apply function to main array
Apply the previous function to the main image array. The function can be either dividing all rows (or columns) by a curve in memory, subtracting a curve in memory from all rows (or columns), boxcar average, lee filter, median, or warping the image to straighten spectral lines. Use with care since the main image array will be modified.

Slider - Start Column
First column of original image array to use for display.

Slider - Final Column
Last column of original image array to use for display.

Pull down menu - Plot
  Redraw image
    Redraw the image included any display, axis changes.

Zoom in with cursor
Use cursor to zoom in on portion of image.

Zoom out
Zoom out a factor of three.

Previous zoom
Go back to the previous zoomed image.

New image (congrid)
Resize displayed image using the *congrid* routine (see IDL manual). Interpolates to exact dimensions specified. However this is much slower than the *rebin* routine.

New image fill window (congrid)
Resize displayed image using the *congrid* routine (see IDL manual). Will fill entire window. Interpolates to exact dimensions specified. However this is much slower than the *rebin* routine.

New image (rebin)
Resize displayed image using *rebin* routine (see IDL manual). This method is fast but the region you get may vary from your selection since the dimensions must be integer multiples of the original dimensions.

New image (rebin-sample)
Resize displayed image using *rebin* routine with the sample keyword (see IDL manual). This shows the original image without interpolation. This method is fast but the region you get may vary slightly from your selection since the dimensions must be integer multiples of the original dimensions.

2nd Pull down menu - **Adjust draw window size**

Change x-dimension
Enter the horizontal size (pixels) of the draw window in the **In/Out** box.

Change y-dimension
Enter the vertical size (pixels) of the draw window in the **In/Out** box.

2nd Pull down menu - **Adjust view borders**
Allows one to adjust the size of the draw window where the image is displayed.

Change x-border
Enter the horizontal border around image (pixels) in the **In/Out** box.

Change y-border
Enter the vertical border around image (pixels) in the **In/Out** box.

Shift cropped image
Opens a new widget window allowing user to shift the cropped image by varying amounts without changing the size and shape. See section 6.5 for a complete description.

Reset
Reset to displaying original image.

Pull down menu - **Menu**

Show lineout
Display either horizontal or vertical lineout of image at position where mouse is clicked. Calls the routine *aim_imglin* that opens a new widget window. See section 6.6 for a complete description.

Invert intensity on-off
Switch between having intensity scale (i.e. colors) normal or inverted for displayed image.

Color bar on-off
Switch between showing or not showing color bar.

Zero bottom-left on-off
Switch between setting the bottom-left corner of the cropped window as the origin or bottom-left corner of main image as the origin. If this is on it will change your calibrated x and y values since they are based on the origin of the original main image array.

White backgrnd on-off
Switch between black or white background.

Two-color display on-off
    Switch between displaying images using only two colors or regular display. A threshold is used to determine the two colors.

Change two-color threshold
    Change threshold for two-color display in **In/Out** box.

Box in main on-off
    Turn on/off the box in the main widget window showing region that is being displayed here.

Slider - **Start Row**
    First row of original image array to use for display.

Slider - **Final Row**
    Last row of original image array to use for display.

Button on/off - **Axis(pix)**
    If set will overlay axis (units will be row and column numbers) and contour plot (if **Cnt_lev** >0).

Button on/off - **Axis(mm)**
    If set will overlay axis (units will be film position in mm) and contour plot (if **Cnt_lev** >0).

Button on/off - **Axis(cal)**
    If set will overlay axis (units will be from calibration) and contour plot (if **Cnt_lev** >0). The axis scale and contours will not match exactly with the image if the calibration uses a polynomial of degree > 1.

Text/editable - **Cnt_lev**
    Number of contour levels to use in overlay of contour plot. Zero will plot axis but no contours.

Text/editable - **X_sh**
    Shift x-axis by this number.

Text/editable - **Y_sh**
    Shift y-axis by this number.

Button on/off - **Keep aspect ratio**
    If set will maintain aspect ratio of image.

Button on/off - **Exposure**
    If set will display calibrated exposure of image. May be slow.

Button on/off - **Byt_scal**
    If set will scale image to maximum number of allowed colors.

Text/editable - **Gam**
    Adjust gamma to enhance contrast in image.

Text/editable - **I_min**
    Minimum intensity (counts) to be displayed.

Text/editable - **I_max**
    Maximum intensity (counts) to be displayed.

Text/editable - **Asp_ratio**
    Aspect ratio of displayed image.

Text/editable - **Rot.**
    Will rotate image the specified number of degrees.

Text/editable - **Filtr**
    The size of the filter box is 2 * (this number) + 1. Used for the boxcar average, Lee filter and median filter.

6.1 Save image to postscript-image file

Pull down menu - **File type**

Landscape postscript

Save the image to a landscape postscript file that can be sent directly to a printer.

Portrait postscript

Save the image to a portrait postscript file that can be sent directly to a printer.

Encapsulated postscript

Save the image to an encapsulated postscript file that can not be sent directly to a printer, but can be imported into a MS Word, etc., document.

EPS, Image only

Save <u>only</u> the image (does not include the axis or labels) to an encapsulated postscript file that can not be sent directly to a printer, but can be imported into a MS Word, etc., document.

EPS, Color bar only

Save <u>only</u> the color bar to an encapsulated postscript file that can be imported into a MS Word, etc., document.

TIFF

Save the image to a TIFF file.

PICT

Save the image to a Mac Pict file.

GIF

Save the image to a GIF file.

HDF

Save the image to an HDF file.

Y-Div, Raw data

Save the image to a Y-Div pds file.

V-Div, Raw data

Save the image to a V-Div img file.

Button on/off - **Color bar**

If set will include a color bar to the right of image in postscript file.

Button on/off - **Invert intensity**

If set will invert the intensity scale of the image in the postscript file.

Text/editable - **Scale (0-1)**

Adjust the size of the image in the postscript file. 1 = full size.

Text/editable - **Axis color**

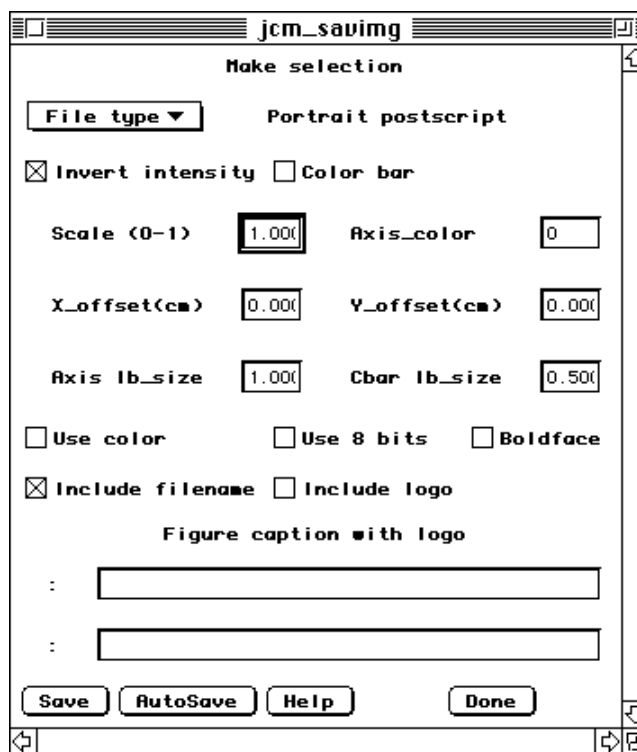Select the axis and contour color (if contours are included). Must be from 0-255. The color will depend on the color table presently being used. See IDL manual for more details.

Text/editable - **X_offset(cm), Y_offset(cm)**

Offset to be used for placement of image on page when saved to a landscape or portrait postscript file.

Text/editable - **Axis lb_size**

Size of axis labels. Default=1.

Text/editable - **Cbar lb_size**
    Size of color bar labels. Default =1.

Button on/off - **Use color**
    If set will save to a color postscript file.

Button on/off - **Use 8 bits**
    If set will save postscript file using 8 bits (default = 4 bits).

Button on/off - **Boldface**
    If set will use boldface fonts in postscript file.

Button on/off - **Include filename**
    If set will include the filename above the plot in the postscript file.

Button on/off - **Include logo**
    If set will display logo at the top. The default is the LLNL logo.

Text/editable - **Figure caption with logo**
    If you selected *Include logo* then you any text entered here will be included in the postscript file as a caption at the top of the page.

Button - **Save**
    Save the file using the IDL *pickfile* routine.

Button - **AutoSave**
    Automatically save to the selected file type. The file name will be image#.ps (or image#.tif if TIFF file, etc.) where # will be an integer that is automatically incremented each time.

Button - **Help**
    Display help widget window showing information about this widget.

6.2 Add shapes to image

Slider - **Shape #**
   Select the shape number (1-10).

Pull down menu - **Shape**

None
   No shape entered.

Line
   A line is drawn from the initial column and row selected (Col_init, Row_init) to the final column and row (Col_fin, Row_fin).

Rectangle
   A rectangle is drawn with one corner at the initial column and row selected (Col_init, Row_init) and the other corner at the final column and row (Col_fin, Row_fin).

Ellipse
   An ellipse is drawn with its center at the initial column and row selected (Col_init, Row_init) and the width and height determined by the number entered for final column and row (Col_fin, Row_fin).

Text/editable - **Thickness**
   The thickness of the line used to draw the selected shape.

Text/editable - **Col_init**
   Initial column number for line, left edge for rectangle, center for ellipse.

Text/editable - **Row_init**
   Initial row number for line, bottom edge for rectangle, center for ellipse.

Text/editable - **Col_fin**
   Final column number for line, right edge for rectangle, width in columns of ellipse.

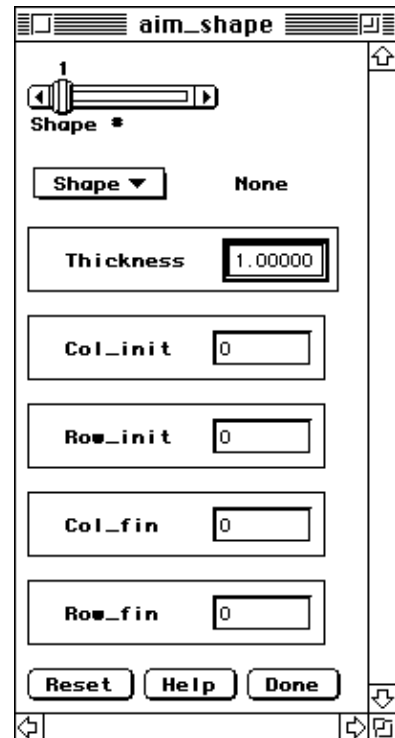**Text/editable** - **Row_fin**
   Final row number for line, top edge for rectangle, height in rows of ellipse.

Button - **Reset**
   Delete all shapes.

Button - **Help**
   Display help widget window showing information about this widget.

6.3 Find fringes

This routine can be used to find fringes and/or spectral lines. The user clicks with the mouse along a fringe (or spectral line) and the fringe will be traced by looking for the maxima along that line.

Button - **Start horiz**
    Start search for horizontal fringes. Click along the fringe (or spectral line) with the mouse.

Button - **Start verti**
    Start search for vertical fringes. Click along the fringe (or spectral line) with the mouse.

Button - **Next fringe**
    Move onto next fringe (or spectral line). A line will drawn along the previous fringe.

Button - **Remove prev**
    Delete last fringe.

Button - **Save to file**
    Save fringe xy data to an ASCII file.

Button - **Clear all**
    Clear all fringes.

Button - **Read file**
    Read fringe xy data from an ASCII file.
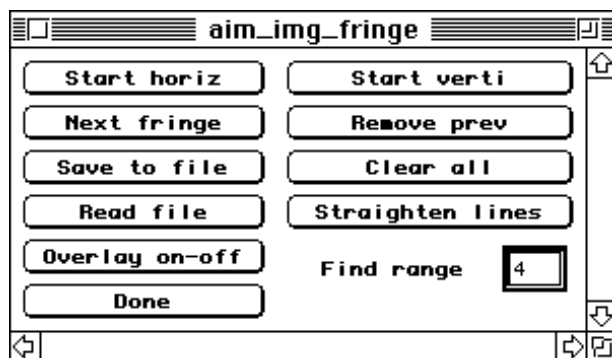
Button - **Straighten lines**
    Straighten the spectral lines by warping image displayed in image analysis window.

Button - **Overlay on-off**
    Turn on-off the overlay of line plots of all fringes found so far.

Text/editable - **Find range**
    Change number of neighboring rows or columns that are searched to find maximum for fringe.

6.4 Average images together

This widget can be used to average together several different regions of the original image into a new image. The IDL routine *correlation* is used to find the best fit between the regions. Any number of cropped regions can be selected.

Button - **Start**

Click on this button to select a cropped portion of the image as the first region to average together with another section of the image. A rectangular box determined by **X edge** and **Y edge** will show the actual region that will be used for the correlation fits. All correlation fits will be performed relative to this first selected region. The user should now shift the cropped image to another region using the shift cropped image widget.

Button - **Find best fit**

A correlation will be performed to get the best match between the presently selected cropped region and the first region. This region will then be added to list of regions being averaged. This region must be the same size as the first region selected.

Button - **Remove last**

Remove the last region selected from the list of regions to be averaged.

Button - **Print info**

Print in the IDL window information about the size and location of the presently selected region.

Button - **Mouse shift**

Change the position of the region to use for the correlation by clicking the mouse at the center position. Can keep clicking the mouse to change the position. A box will indicate the region.

Button - **Show correlation**

Show a surface plot of the correlation fit. Call the routine *xsurface*. This surface should have a discernable peak for optimum correlation accuracy.

Button - **Go to previous**

Go back and display the previously selected region for adjustments. Must have at least three regions selected in order to use this button.

Button - **Go to next**

Go to next selected region for adjustments. Must have at least three regions selected in order to use this button.

Button - **Compare**

Clicking this button will toggle between showing the present cropped image and the initial cropped image. If **Overlay** is set then clicking this button will switch between showing the present cropped image and an overlay of the present cropped image averaged with the initial cropped image.

Button on/off - **Overlay**

If set then clicking the **Compare** button will toggle between showing the present cropped image and an overlay of the present cropped image averaged with the initial cropped image.
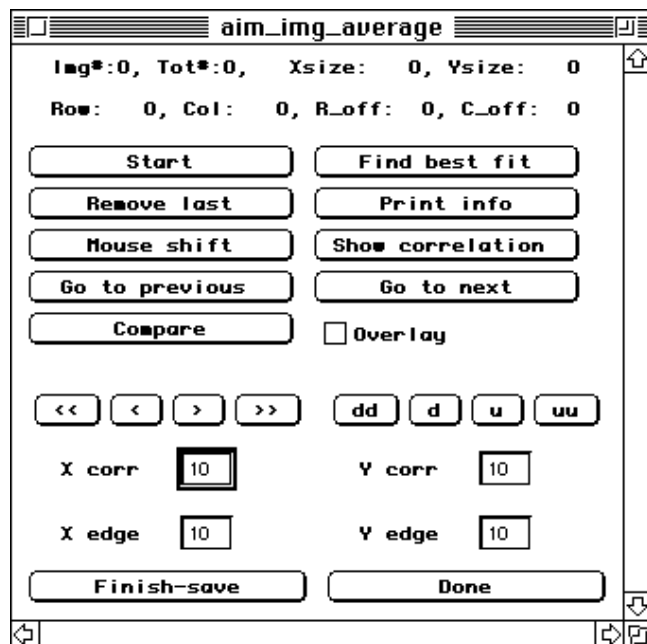
Button - <<
    Move the presently selected region to the left by two columns.

Button - <
    Move the presently selected region to the left by one column.

Button - >
    Move the presently selected region to the right by one column.

Button - >>
    Move the presently selected region to the right by two columns.

Button - **dd**
    Move the presently selected region down by two rows.

Button - **d**
    Move the presently selected region down by one row.

Button - **u**
    Move the presently selected region up by one row.

Button - **uu**
    Move the presently selected region up by two rows.

Text/editable - **X corr**
    Change the number of columns to scan when doing the correlation fits to find the best image match.

Text/editable - **Y corr**
    Change the number of rows to scan when doing the correlation fits to find the best image match.

Text/editable - **X edge**
    Change the number of columns in the edge region which is *not* used for the correlation fits.

Text/editable - **Y edge**
    Change the number of rows in the edge region which is *not* used for the correlation fits.

Button - **Finish-save**
    Average all the cropped images that have been selected. The new averaged image will be saved as the image array in memory in the main aim widget.

6.5 Shift cropped image

Button - **dddd**

Shift the cropped image down by the vertical size of the image.

Button - **ddd**

Shift the cropped image down by 1/8 the vertical size of the image.

Button - **dd**

Shift the cropped image down by eight rows.

Button - **d**

Shift the cropped image down by one row.

Button - **u**

Shift the cropped image up by one row.

Button - **uu**

Shift the cropped image up by eight rows.

Button - **uuu**

Shift the cropped image up by 1/8 the vertical size of the image.

Button - **uuuu**

Shift the cropped image up by the vertical size of the image.

Button - <<<<

Shift the cropped image to the left by the horizontal size of the image.

Button - <<<

Shift the cropped image to the left by 1/8 the horizontal size of the image.

Button - <<

Shift the cropped image to the left by eight columns.

Button - <

Shift the cropped image to the left by one column.

Button - >

Shift the cropped image to the right by one column.
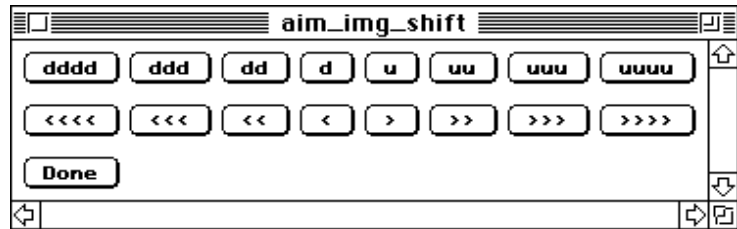
Button - >>

Shift the cropped image to the right by eight columns.

Button - >>>

Shift the cropped image to the right by 1/8 the horizontal size of the image.

Button - >>>>

Shift the cropped image to the right by the horizontal size of the image.

6.6 Image lineout

This widget window will display a lineout from the image analysis window. Clicking on the image display will produce a lineout in this draw window corresponding to the position where the mouse was clicked. Use the pull-down menu here to switch between horizontal and vertical lineouts.
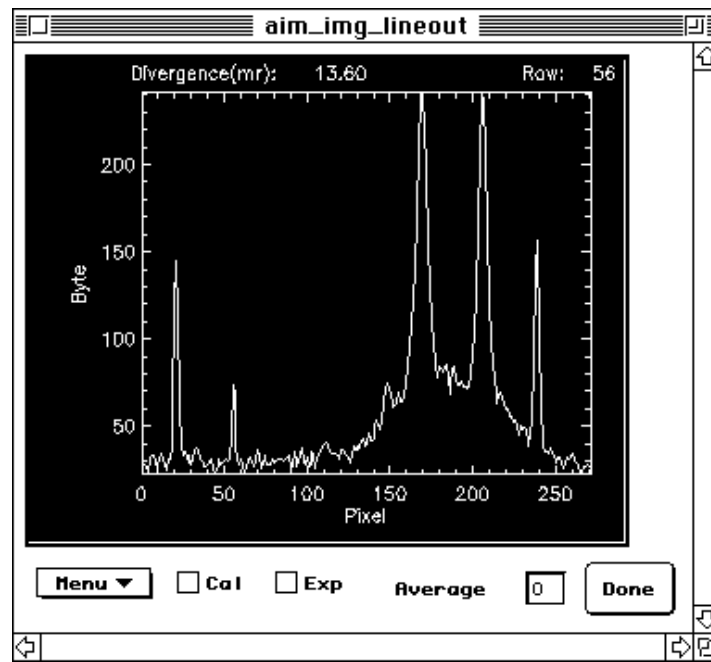
Pull down menu - **Menu**

    Horizontal

        Take horizontal lineout when mouse is clicked on image.

    Vertical

        Take vertical lineout when mouse is clicked on image.

    Histogram

        Draw histogram of image intensity.

    Save to postscript-ascii file

        Save graph to postscript file or ASCII data file. Calls the routine *jcm_savgrph* that opens a new widget window. See section 5.1 for a complete description.

    Help

        Display help widget showing information about this image lineout widget.

Button on/off - **Cal**

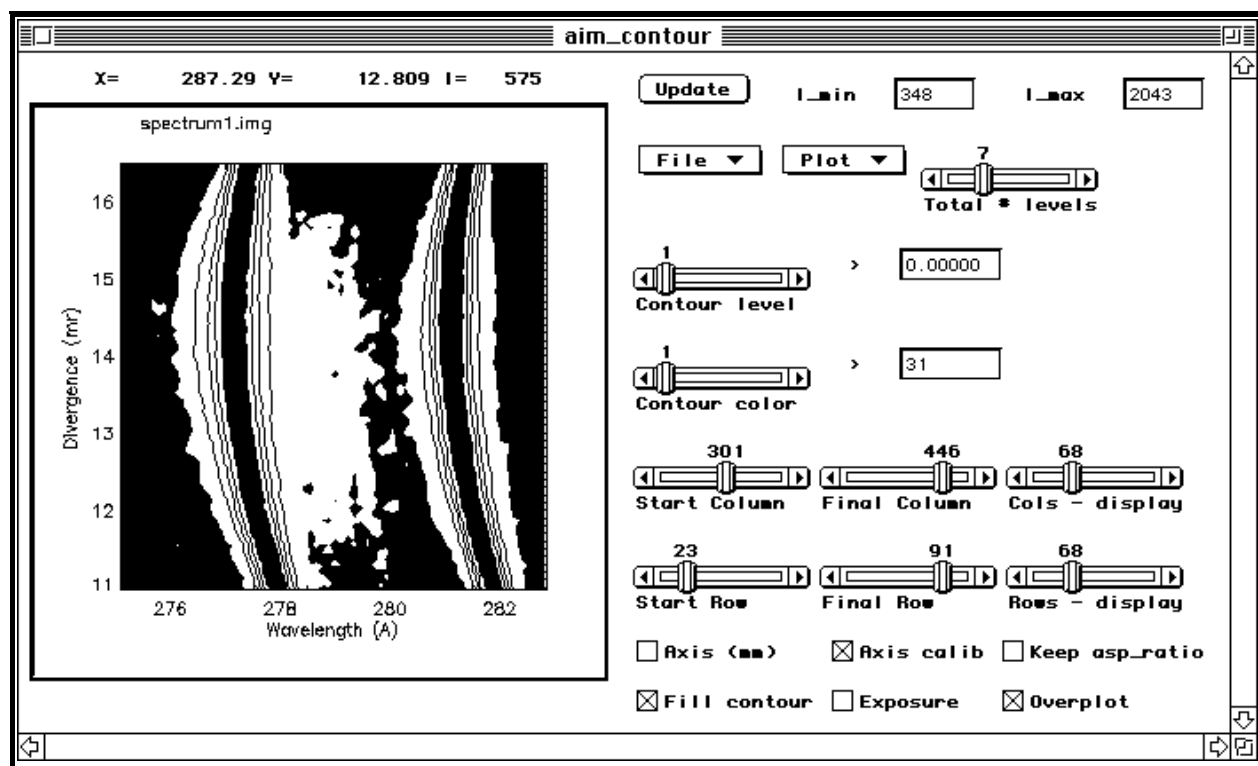   If set will use axis calibration for x-axis.

Button on/off - **Exp**

    If set will plot exposure for y-axis.

Text/editable - **Average**

    Number of neighboring rows or columns to average over when doing lineout.

7.0 Contour plots

Button - **Update**
Redraws the contour plot. Will recalculate the displayed contour if columns or rows have changed.

Text/editable - **I_min**
Minimum intensity (counts) to be displayed.

Text/editable - **I_max**
Maximum intensity (counts) to be displayed.

Pull down menu - **File**
Save to postscript file
Save contour to postscript file. Calls the routine *jcm_savcns* that opens a new widget window. See section 7.1 for a complete description.
Help
Display help widget showing information about this contour widget.
Stop
Purposely causes an error in the program to get out of the xmanager.

Pull down menu - **Plot**
Draw new contour
Redraws the contour plot. Will recalculate the displayed contour if columns or rows have changed.
Zoom in with cursor
Use cursor to zoom in on portion of image and then draw a new contour plot.
Labels
Include user positioned labels in the contour plot. Calls the routine *jcm_label* that opens a new widget window. See section 5.5 for a complete description.
Grid-tickmarks

Change grid or tickmarks. Calls the routine *jcm_grid* that opens a new widget window. See section 5.7 for a complete description.

Graph position

Change position of contour plot on screen/output. Calls the routine *jcm_gsize* which opens a new widget window. See section 5.7 for a complete description.

Reset

Reset to full size of image array.

Color bar on-off

Switch for showing a color bar on the screen.

White backgrnd on-off

Switch between black or white background.

Box region - main

Turn on/off the box in the main widget window showing region that is being displayed here.

Slider - Total # levels

Total number of contour levels and colors to use.

Slider - Contour level

Contour level # to be adjusted.

Text/editable - Contour level

Intensity of contour level relative to the minimum and maximum values (0-1).

Slider - Contour color

Level # of color to be adjusted.

Text/editable - Contour color

Color of contour fill.

Slider - Start Column

First column of original image array to use for display.

Slider - Final Column

Last column of original image array to use for display.

Slider - Cols - display

Number of columns to use in contour plot. Increase this number to get more resolution in contour plot.

Slider - Start Row

First row of original image array to use for display.

Slider - Final Row

Last row of original image array to use for display.

Slider - Rows - display

Number of rows to use in contour plot. Increase this number to get more resolution in contour plot.

Button on/off - Axis (mm)

If set will have axis in mm for contour. The default is rows and columns for the axes.

Button on/off - Axis calib

If set will use the polynomial calibration for axis.

Button on/off - Fill contour

If set will use filled contours.

Button on/off - Exposure

If set will use exposure calibration for intensity of plots.

Button on/off - Overplot

If set will overplot filled contours with contour lines.

7.1 Save contour/surface plot to postscript file

Pull down menu - **File type**

Landscape postscript

Save the contour plot to a landscape postscript file that can be sent directly to a printer.

Portrait postscript

Save the contour plot to a portrait postscript file that can be sent directly to a printer.

Encapsulated postscript

Save the contour plot to an encapsulated postscript file that can not be sent directly to a printer, but can be imported into a MS Word, etc., document.

EPS, Color bar only

Save <u>only</u> the color bar to an encapsulated postscript file that can be imported into a MS Word, etc., document.

Button on/off - **Invert**

If set will invert the intensity scale of the image in the postscript file.

Button on/off - **Color bar**

If set will include a color bar to the right of contour plot in the postscript file.

Button on/off - **Match bar cont**

If set will have scale on color bar correspond to the contour levels. If not selected then the scale will be labeled every 1/10 of the intensity range.

Text/editable - **Scale (0-1)**

Adjust the size of the contour/surface plot in the postscript file. 1 = full size.

Text/editable - **Axis color**

Select the axis and contour color. Must be from 0-255. The color will depend on the color table presently being used. See IDL manual for more details.

Text/editable - **X_offset(cm), Y_offset(cm)**

Offset to be used for placement of image on page when saved to a landscape or portrait postscript file.

Text/editable - **Axis lb_size**

Size of axis labels.

Text/editable - **Cbar lb_size**
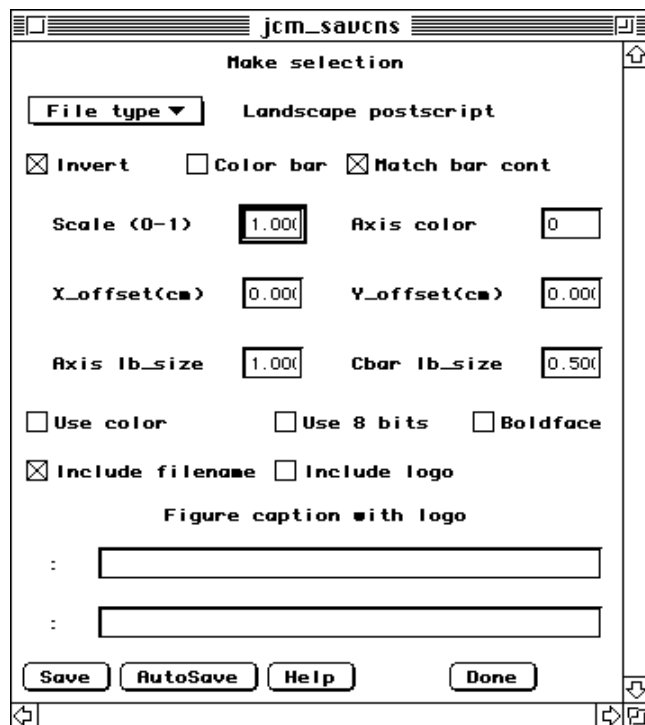
Size of color bar labels.

Button on/off - **Use color**

If set will save to a color postscript file.

Button on/off - **Use 8 bits**

If set will save postscript file using 8 bits for the contour rather the default 4 bits.

Button on/off - **Boldface**
   If set will use boldface fonts in postscript file.

Button on/off - **Include filename**
   If set will include the filename above the plot in the postscript file.

Button on/off - **Include logo**
   If set will display logo at the top. The default is the LLNL logo.

Text/editable - **Figure caption with logo**
   If you selected *Include logo* then you any text entered here will be included in the postscript file as a caption at the top of the page.

Button - **Save**
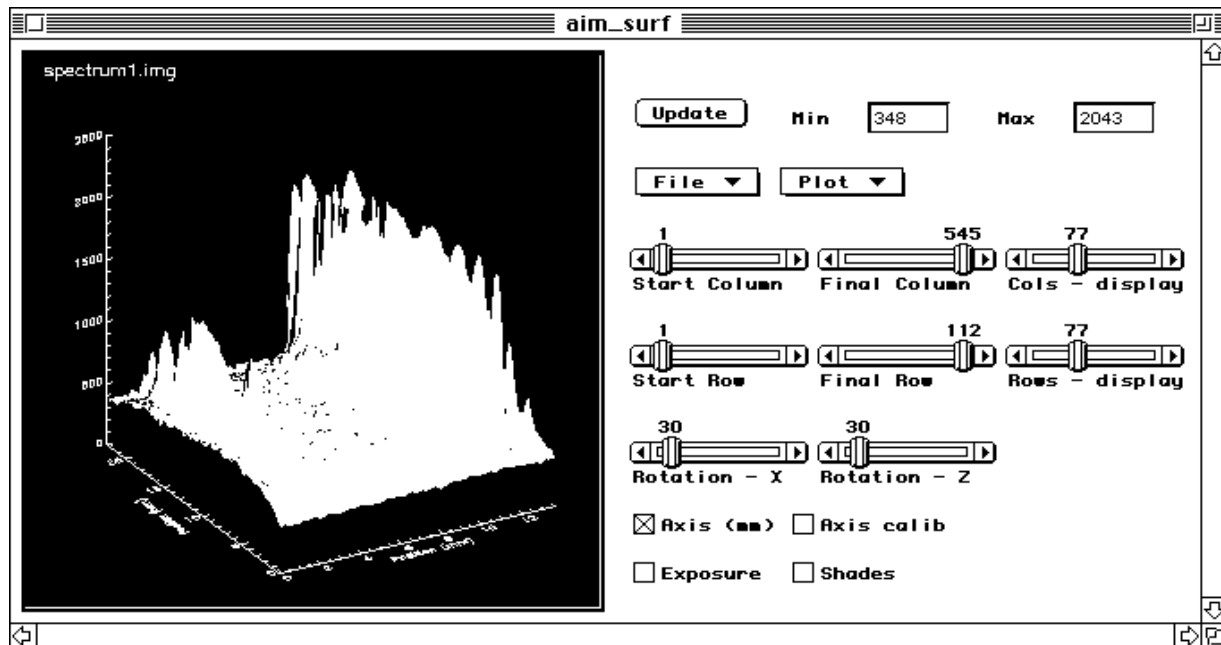   Save the file using the IDL *pickfile* routine.

Button - **AutoSave**
   Automatically save to a postscript file. The file name will be contour#.ps (or surface#.ps if a surface plot) where # will be an integer that is automatically incremented each time.

Button - **Help**
   Display help widget window showing information about this widget.

8.0 Surface plots

Button - **Update**
   Redraws the previous plot including any changes made to start column, final column, cols - display, angles, etc.

Text/editable - **Min**
   Minimum intensity (counts) to be displayed.

Text/editable - **Max**
   Maximum intensity (counts) to be displayed.

Pull down menu - **File**
   Save to postscript file
      Save surface, shad_surf or show3 plot to a postscript file. Calls the routine *jcm_savcns* that opens a new widget window. See section 7.1 for a complete description.
   Help
      Display help widget showing information about this surface plot widget.
   Stop
      Purposely causes an error in the program to get out of the xmanager and allow you to do any special image analysis or recompile a routine.

Pull down menu - **Plot**
   Surface plot
      Display surface plot of image array
   Shade_surf plot
      Display shaded surface plot of image array.
   Show3 plot
      Use show3 routine to display image array by combining a surface plot, a contour plot and an image.
   Labels
      Include user positioned labels in the surface plot. Calls the routine *jcm_label* that opens a new widget window. See section 5.5 for a complete description.

Grid-tickmarks
Change grid or tickmarks. Calls the routine *jcm_grid* that opens a new widget window. See section 5.7 for a complete description.

Reset
Reset to full size of image array.

White backgrnd on-off
Switch between black or white background.

Box region - **main**
Turn on/off the box in the main widget window showing region that is being displayed here.

Slider - **Start Column**
First column of original image array to use for display.

Slider - **Final Column**
Last column of original image array to use for display.

Slider - **Start Row**
First row of original image array to use for display.

Slider - **Final Row**
Last row of original image array to use for display.

Slider - **Rows** - **display**
Number of rows to use in display of surface. Increase this number to get more resolution in surface plot.

Slider - **Cols** - **display**
Number of columns to use in display of surface. Increase this number to get more resolution in surface plot.

Slider - **Rotation** - **X**
Angle of surface with respect to x-axis (degrees).

Slider - **Rotation** - **Z**
Angle of surface with respect to z-axis (degrees).

Button on/off - **Axis (mm)**
If set will have axis in mm for surface plots. The default is rows and columns.

Button on/off - **Axis calib**
If set will use the polynomial calibration for the axes.

Button on/off - **Exposure**
If set will use exposure calibration for intensity of plots.

Button on/off - **Shades**
If set will use color shading for shade_surf.

9.0 Zoom image

This widget window can be used along with the lineout widget. The user can zoom in on a small region of the image. When the mouse is moved over a lineout plot, the position of the mouse will be shown in this window along with the main widget window.

Slider - **X center**
 Center x position (from 1-99) of portion of main image to magnify.

Slider - **Y center**
 Center y position (from 1-99) of portion of main image to magnify.

Button - **<**
 Click here to shift magnified portion of image to the left.

Button - **>**
 Click here to shift magnified portion of image to the right.

Button - **d**
 Click here to shift magnified portion of image down.

Button - **u**
 Click here to shift magnified portion of image up.

Slider - **X zoom**
 Magnification in the horizontal direction.

Slider - **Y zoom**
 Magnification in the vertical direction.

Text/editable - **Min**
 Minimum intensity(counts) to be displayed.

Text/editable - **Max**
 Maximum intensity(counts) to be displayed.

Button - **Apply**
 After adjusted center positions and magnifications, click here to calculate and display new zoomed region.

Button - **Box**
 Click here to turn on/off the box in the main widget window showing region that is being magnified.